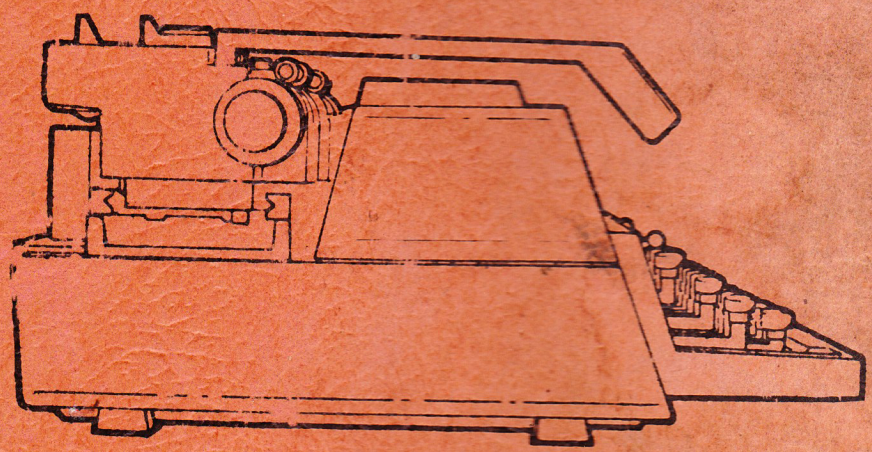
olivetti

Customer Engineering Service

LINEA 98



FAULT-FINDING and FAULT-REPAIR GUIDES

October 1972

SPD-98-FFR

For "HOW TO USE THIS GUIDE"
see following page

Harold

LINEA 98

PART 1

FAULT-FINDING GUIDE

HOW TO USE THE FAULT-FINDING AND FAULT-REPAIR GUIDE

This Fault-Finding Guide (FFG) and its associated Fault-Repair Guide (FRG) are designed to assist the customer engineer, who has had prior typewriter experience, in locating the problem area in the machine after he has diagnosed the malfunction.

When the problem area or particular mechanism has been found, the customer engineer must make the necessary corrections in order to eliminate the cause of the malfunction by following the instructions in the Guide.

This Guide is divided into two parts:

Part 1, the Fault-Finding Guide, lists various machine malfunctions and functional tests relative to specific features of the machine. Each listed malfunction indicates the "mechanical checks" in the Fault-Repair Guide which are to be performed.

Part 2, the Fault-Repair Guide, is divided into two sections:

1 - Inspect - Adjust (mechanical checks)
2 - Removals and Installations (machine covers - carriage - carriage fixed rail assembly)

It is advisable to consult the FRG only after following the instructions outlined in the FFG.

Detailed Use of the Fault-Finding Guide

The FFG consists of 9 (general symptom) sections. Each section is identified by a "tab" that corresponds to a particular feature of the machine, and contains a list of malfunctions (sub-symptoms) that may occur within that section.

When the customer engineer finds a malfunction in some area of the machine, he must refer to the corresponding section in the FFG.

Note: The customer engineer should obtain an explanation or an actual sample of the problem from the operator. If this information is not available or there is uncertainty about the applicable sub-symptom, perform the test that appears on the page facing that particular section.

The following examples show various machine malfunctions and how they are associated with their respective (general symptom) sections.

1 - Assume there are problems in the printing area of the machine, e.g.: the ribbon does not feed, reverse or mixes colors; the escapement does not permit the carriage to space; the printing is too light or blurry; or the keyboard is locked. The appropriate section to refer to is "Printing Faults."

2 - Malfunctions relative to the space bars are found in the "Space Bar Faults" section.

3 - Malfunctions relative to the shift keys or shift-lock key are found in the "Shift Faults" section.

4 - Malfunctions relative to line spacing, line space selector, memory line finder, variable, and also soiled or wrinkled paper problems are found in the "Line Space and Paper Feed Faults" section.

5 - Malfunctions relative to margins, paragraph indentation, margin release, line lock, and type bars jam release are found in the "Margin Faults" section.

6 - Malfunctions relative to back spacing, tab set and clear, and tabulation are found in the "Back Space and Tabulation Faults" section.

7 - Malfunctions that can cause various functions of the machine to be locked, and miscellaneous items not covered in the other sections are found in the "Machine Locked and Miscellaneous Faults" section.

8 - If a part(s) or assembled unit has been replaced, the entire mechanism involved must be checked. This can be done by referring to the "Complete Check of Mechanisms" section. This section contains a complete list of all the mechanisms of the machine together with the related checks to be performed and the sequence of performance.

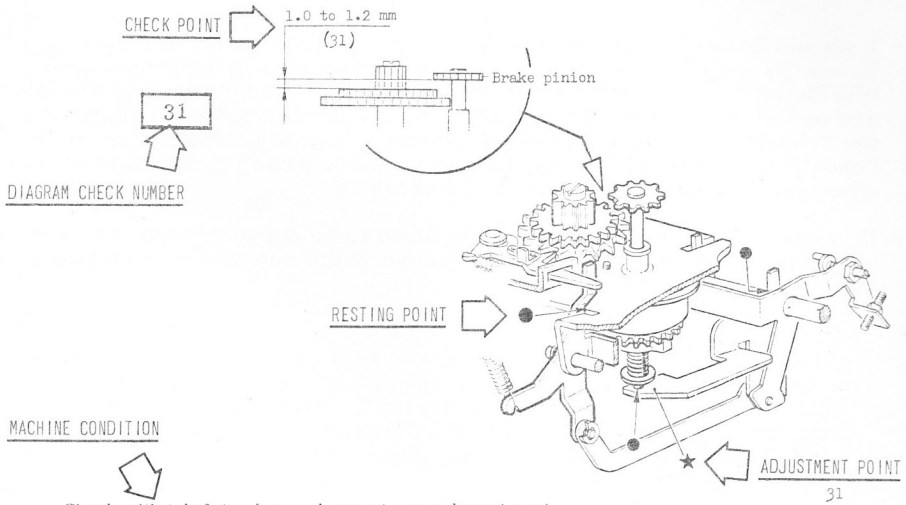
For the customer engineer to find the proper page(s) and check points in the FRG, he will (1) review all the sub-symptoms in the Section he has chosen, (2) select the sub-symptom which best relates to the actual machine malfunction, and (3) obtain in the adjacent right-hand column for that sub-symptom the numbers that represent the mechanical checks (also represent the page number in the FRG) that must be made and the sequence in which they are to be performed.

The following is an example showing a portion of a page from the FFG.

SPACE BAR FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
Normal space bar	
1) SPACE BAR DOES NOT SPACE	68-17-18-20-24-25
2) SPACING IS IRREGULAR	
Spacing is irregular because carriage does not move freely	21-30-49-93-95-99
Spacing is irregular and carriage moves freely	20

There are several types of symbols used in the diagrams of the FRG that must be understood. The following diagram is a typical example which shows and describes the meaning of these symbols:

REST POSITION OF CENTRIFUGAL BRAKE PINION

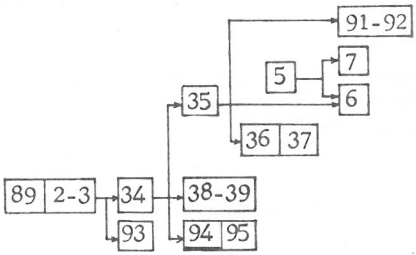


- Check Point. Shows specific area and parts that are to be checked.
- Diagram Check Number. Shows a check number and its interrelation to other check numbers. The interrelated check numbers must be carefully followed before and after making an adjustment.

- Machine Condition. Describes condition that machine must be in to check various adjustments. This is always shown at bottom of page.
- Resting Point. Shows rest position or limiting position of specific parts. Resting points are usually indicated by an arrow, e.g., ●——►
- Adjustment Point. Shows where adjustment is to be made and is indicated by a star ★.

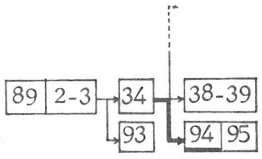
Explanation of the Diagram Check Numbers

Example 1

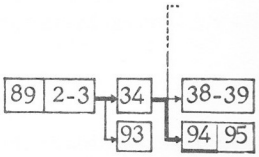


The chart on the left is an example of a complex diagram showing interrelated "check numbers" as found on check 94 in the FRG.

- It should be noted that the "check" under examination (in this case 94) is heavily underscored, and its correct adjustment is dependent upon interrelated "check numbers" to the left of it. If the "checks" to the left are out of adjustment, they could cause incorrect conditions to exist in the "check" under examination. Likewise, any adjustment made in the "check" (94) could upset adjustments in the "checks" to the right of it and, consequently, they would have to be checked.
- If, after performing check 94, it is found to be out of adjustment, it would be necessary to determine that the cause is not due to a malfunction in its interrelated check 34.

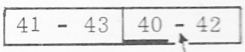


- If check 34 is found to be correct, then check 94 can be adjusted, but check 95 will then have to be verified since it is interrelated with 94.
- If check 34 is not correct, it will be necessary to verify checks 3 and 2 but not 93, since the latter is not related to 94.



- If checks 3 and 2 are correct, it will then be necessary to adjust check 34. After adjusting check 34, it will be necessary to verify all the checks to the right of 34. This would include checks 94, 95, 38, 39, 35, 36, 37, 91, 92 and 6.

Example 2



The example on the left shows a simple diagram of a related adjustment as found in check 40 of the FRG. The two checks in the frame are divided by a dash which means they have the same common point of adjustment.

- If check 40 is not correct, it would be necessary to first verify check 41 and then 43. If checks 41 and 43 are incorrect, they should be adjusted followed by again verifying check 40 and then 42.

Example 3

This example shows a check that is completely independent from any other check or adjustment.

General Test

- If, when performing a check, it is found that a particular clearance or condition is not as shown in the diagram, it may be due to parts being out of position, defective, etc. Therefore, do not immediately conclude that an actual adjustment is required. Examine the parts of the machine which are involved in the check diagram according to the following "general test."

  - Screws and nuts are tight
  - Retaining clips are securely in place
  - Springs are in good condition and hooked properly
  - Parts are free without binding
  - Proper lubrication where needed
  - Parts are not worn, defective, broken or have loose rivets, welds, etc.
  - Parts are positioned correctly

Practical Example in Use of the Guide

Now that all the intermediate steps in the use of the Guide have been covered, we will combine the steps into the following practical example to see how the Guide functions under actual use.

The customer's Linea 98 cannot be used because the character keys are locked.

The customer engineer must:

1. Refer to the FFG and review the appropriate section. (In this case, "Printing Faults.")

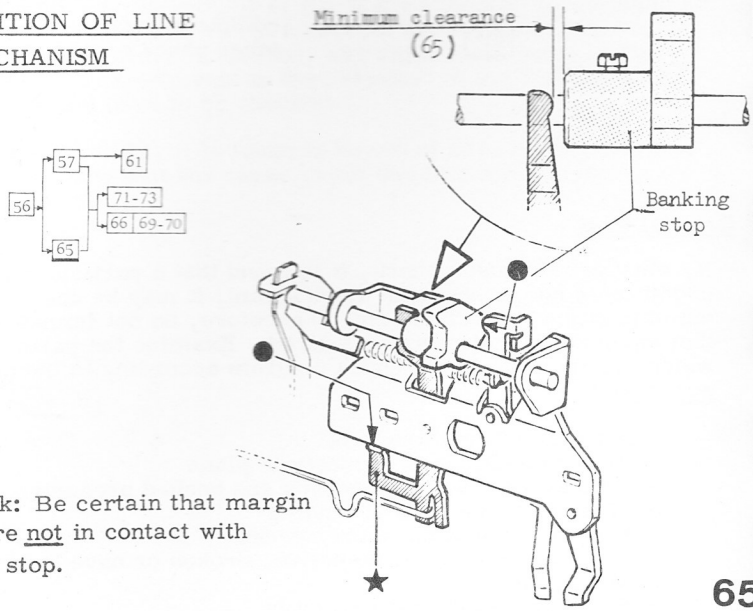
2. Review the complete list of "sub-symptoms" to decide which one best relates to the actual machine malfunction.

Type bars are jammed or do not rise	1
It is not possible to type into last space of carriage (even though margin release key has been depressed)	60
Keyboard is locked	65-66-67-68a

3. Obtain the numbers and sequence of the checks in the FFG which are to be performed. These are listed, in order, in the right-hand column opposite the sub-symptom selected. (In this case, the first check to be performed is 65. Then 66, 67, and 68a, in that order.)

4. Refer to appropriate page/check in the FRG. (In this case, page 65 - Rest Position of Line Lock Mechanism) and examine the diagram and the location of related parts.

REST POSITION OF LINE LOCK MECHANISM



- To check: Be certain that margin stops are <u>not</u> in contact with banking stop.

65

5. Consider "machine condition" noted on the diagram. (In this case we must be certain that the margin stops are not in contact with the banking stop.)

6. Check that "resting points" are as indicated by the arrows ●→ and then observe if the required clearances shown in the diagram exist or not.

   If the minimum clearance exists, then perform the next check (66).

   If the clearance is not correct, do not assume that an adjustment has to be made until you check the condition of the part(s), as indicated in the "general test" on page 5.

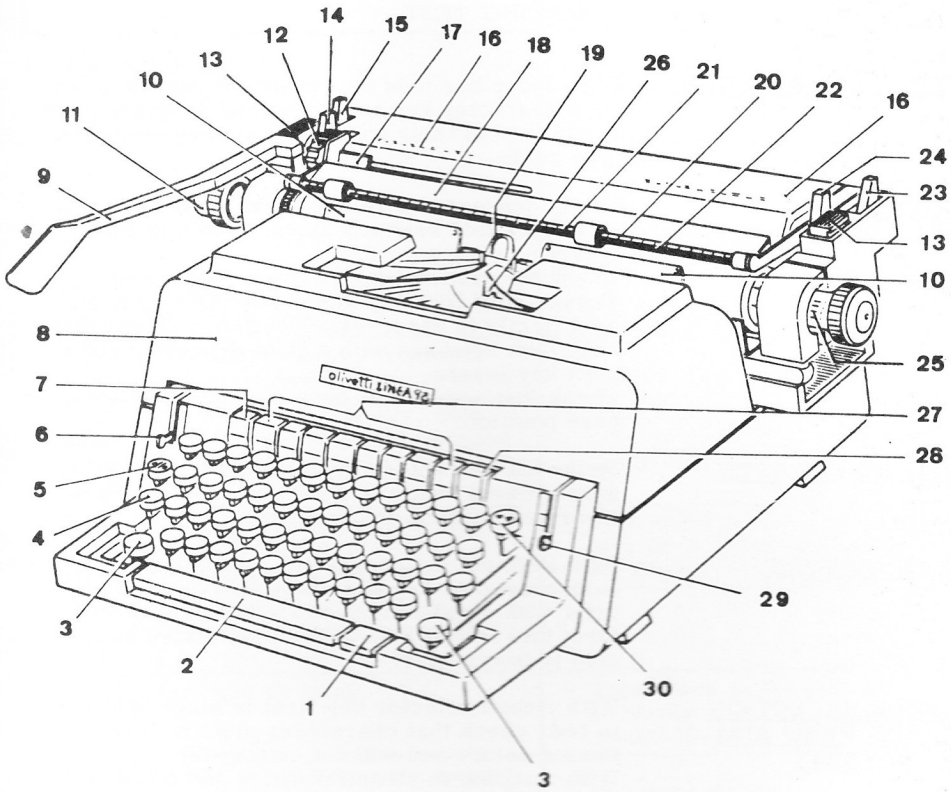
7. After performing the "general test," recheck for the required clearance. (If correct, proceed to check 66.) If the clearance is still incorrect, it might be necessary to make an adjustment, but first perform the "interrelated adjustment checks."

   The diagram shows that check 65 is dependent upon check 56 and, therefore, it must be performed. If check 56 is found to be correct, then the clearance adjustment in check 65 can be made.

   Since check 65 affects all the checks to its right, it will be necessary to examine them. The diagram shows these checks to be 71, 73, 66, 69 and 70.

   If check 56 was found out of adjustment, it would have been necessary, after performing the adjustment, to examine all the checks shown in the diagram.

8. Finally, after performing all required checks and adjustments, the test at the beginning of the respective section in the FRG must be made to ensure perfect operation of that particular mechanism or feature of the machine.



1 - Repeat Space Key
2 - Space Bar
3 - Shift Key
4 - Shift Lock Key
5 - Margin Release Key (Paragraph Identation and Jammed Type Bars Release)
6 - Touch Control Lever
7 - Tab Set Key
8 - Removable Top Cover
9 - Line Space and Carriage Return Lever
10 - Transparent Aligning Scales
11 - Platen Variable
12 - Line Space Selector Dial
13 - Carriage Release Buttons
14 - Memory Line Finder
15 - Left Margin Setting Lever
16 - Paper Centering Scale
17 - Lateral Paper Guide
18 - Erasing Table
19 - Card Guide
20 - Paper Holding Bail
21 - Title Centering Scale
22 - Carriage Positioning Scale
23 - Right Margin Setting Lever
24 - Paper Release Lever
25 - Page End Indicator
26 - Type Guide
27 - Decimal Key Levers (or Tabulator Bar)
28 - Tab Clear Key
29 - Bichrome Selector Lever
30 - Back Space Key

MACHINE FEATURE IDENTIFICATION

PRINTING TEST

TYPE BARS ARE FREE	- With space bar held depressed, lightly depress each character key and check that they are perfectly free in their travel and as they enter the type guide.
MOTION SHIFT MECHANISM IS FREE SHIFT LOCK	- Slowly depress and release each shift key lever and check that segment moves freely in its travel. - Check the motion (Hh). - Engage shift lock key and check that segment is held firmly in upper-case position. Check that shift lock releases with a light depression of shift key levers. - Check that segment is securely locked in lower-case position.
RING AND PLATEN	- Strike all characters in both upper and lower case. Check that characters print with sharp, clear and uniform impression.
TYPE ON FEET	- With segment in upper case, lightly depress each character key and check that characters print with equal density top to bottom. Perform this test at both ends of the platen and also in lower case.
RIBBON SELECTION RIBBON FEED AND REVERSE	- With ribbon selector key first in black and then in red, check that characters print without mixing colors and without cutting-off. - With machine in stencil position and upper case, check that the "underscore" type safely clears top of ribbon. - Check that ribbon feeds properly in both directions. - Manually shift ribbon reverse arms and check that they positively detent in either position with a light snappy action.
TYPE ACTION ESCAPEMENT TRIP	- Manually raise a center type bar and check that carriage spaces (trips) when face of type block is flush with rear of type guide. Perform same check with end type bars. With these type bars "trip" should occur when face of type block is about 2 mm forward of rear of type guide.

PRINTING FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
1) PRINTS POORLY Misoperation of machine	- Paper release lever or paper holding bail are in a released position - Platen clamps do not lock platen properly - Ribbon is dry, worn, or raveled - Ribbon selector lever is incorrectly positioned
Type does not print properly because ribbon lift is not correct	5-6-7-33-34
Type prints lightly due to improper ribbon feed or ribbon fails to reverse	8-9-11-12
Printing is blurry, too heavy, cuts paper or printing is too light because platen is set too far forward or rearward	- Type block is not aligned properly or is loose on type bar 99-89-2-3-4
Type prints light on top or bottom because type is "off feet" Motion is not correct (Hh)	- Type block is not aligned properly or is loose on type bar 99-89-2-3-33-34-35-36-38
Type prints light or partially due to type bars or their connecting links colliding	1
Printing is light or faint	- Type block is not aligned properly 13-14-15-16
Irregular spacing between characters because carriage does not move freely	21-49-84-93-95-99
Irregular spacing between characters and carriage moves freely	- Type block is not aligned properly 13-14-15-16-20-25
2) DOES NOT PRINT Misoperation of machine	- Ribbon selector lever in stencil position - Ribbon is old, worn, or out of ribbon guide
Does not print because ribbon does not feed or reverse properly	8-9-11-12
Ribbon does not rise	5-6-7
Type bars are jammed or do not rise	1
It is not possible to type into last space of carriage (even though margin release key has been depressed)	60
Keyboard is locked	65-66-67-68a
3) HEAVY TOUCH	- Incorrect position of touch control lever 17-13-14-15-16-19
4) CARRIAGE DOES NOT SPACE	17-18-19-13-14-15-16

SPACE BAR TEST

SPACE BAR - Slowly depress space bar and check that carriage spaces when space bar reaches midpoint of its downward travel.

REPEAT SPACE KEY - Hold repeat space key down and check that carriage spaces with uniform and rhythmic movement.

SPACE BAR FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
Normal space bar	
1) SPACE BAR DOES NOT SPACE	68-17-18-20-24-25
2) SPACING IS IRREGULAR	
Spacing is irregular because carriage does not move freely	21-30-49-93-95-99
Spacing is irregular and carriage moves freely	20
Space bar is not aligned to keyboard cover or does not return to rest	24
Space bar does not lock at right margin stop	68-68a
Repeat space key	
3) REPEAT SPACE KEY DOES NOT SPACE	20-28-29
4) SPEED OF CARRIAGE IS IRREGULAR	27-30-32
5) REPEAT SPACE KEY IS NOT ALIGNED TO SPACE BAR OR DOES NOT RETURN TO REST	26

SHIFT TEST

TYPE ON FEET

- With segment in upper case, lightly strike each character key and check that each character prints with equal density top to bottom. This test should be performed with shift keys held depressed and then with shift lock key engaged. Repeat test with segment in lower case.

MOTION (Hh)
SEGMENT AND SHIFT KEY LEVERS ARE FREE
SHIFT LOCK

- Check freeness of segment and shift key levers by slowly depressing and releasing shift keys.

- Check motion alignment by striking alternately in upper and lower case the following characters:

  Hh, Kk, Ll, Mm, Xx

- Check action of shift lock key and that when the shift lock key is latched segment is securely positioned on lower motion stops. Check that shift lock releases with a light depression of either shift key.

- Check that segment is securely locked in lower-case position.

SHIFT AND SHIFT LOCK KEY FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
1) SHIFT The "type on feet" or "motion" (Hh) is incorrect	- Type block is not aligned properly or is loose on type bar 99-89-2-3-33-34-35-36-38
Shift keys cannot be depressed	37
Segment is not locked in lower case	37
2) SHIFT LOCK KEY Segment is not held firmly in upper-case position	38-39

LINE SPACE AND PAPER FEED TEST

MEMORY LINE FINDER

- Move memory line finder lever forward and check that detent roller is disengaged from platen ratchet and lever remains in forward position.

LINE SPACE

- Perform a line space test for each position of selector dial and check for correct line spacing, as indicated in the following chart:

The type of line space mechanism with which the machine is equipped is identified by an embossed character on ratchet. If a character is not embossed on ratchet, line spacing is "normal."

Z indicates Zurich
R " Ruys (61TR)
I " English (31TR)
2 " Special 2

Position of line space selector dial	No. of clicks				
	Normal	Zurich	English	Special 2	Ruys Amer-Ruys
1	2	2	1	2	2
2	3	3	2	3	3
3	4	4	3	4	4
4	5	5	-	5	5

VARIABLE

- Test that variable does not slip by holding ratchet firmly with a cloth while attempting to turn platen.

PAPER RELEASE LEVER AND FEED ROLLERS

- Move paper release lever forward and check that feed rollers are released so that a carbon pack consisting of 1 sheet of bond paper, 6 sheets of carbon paper and 6 sheets of manifold paper can be inserted and positioned freely.

PAPER HOLDING BAIL

- Move paper release lever forward and check that paper holding bail is released from platen. In this position, rollers must be free to rotate without drifting laterally.

- Paper holding bail must also detent into fully forward, partially raised, and fully raised positions.

LINE SPACE AND PAPER FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
1) LINE SPACE	
Does not line space	89-44-40
Line spacing is incorrect	- Selector dial and/or memory line finder lever incorrectly positioned 89-44-40-41-42-45
Line of write fails to return to original line when rolling back platen	89-44-45
2) LINE SPACE SELECTOR DIAL AND LINE SPACE RELEASE	42-43
3) PAPER	
Paper feeds up crooked	89-45
Paper is torn or wrinkled	- Rollers of paper holding bail do not rotate freely 48-49-93-95
Original or copies are dirty	- Rollers of paper holding bail are dirty 10-45-49-93-95
4) PAPER HOLDING BAIL	47-47a
5) PAPER RELEASE LEVER	46

MARGIN STOPS MOVEMENT FREE

- Bank carriage. Fully rotate left margin setting lever and move carriage slowly to left. Margin stop must remain in constant contact with banking stop. Perform this check with right margin by positioning carriage at right margin, rotate margin setting lever and slowly move carriage to right.

BANKING
MARGIN RELEASE
PARAGRAPH INDENTATION
LINE LOCK

- Position left margin stop at approximately position 20 on carriage positioning scale and perform the following checks:

a) Type a short line of characters and bank carriage. Repeat this procedure several times. Check that all lines vertically align with first typed character in each previous line.

b) Depress margin release key while manually moving carriage to right to determine that it is possible to bypass margin stop. Now start typing and check that carriage does not bind as left margin stop passes by banking stop.

Move right margin stop to right end of carriage. Depress margin release key and check that it is possible to strike another character key.

c) Depress and hold margin release key while returning carriage. Carriage must stop 10 spaces away from left margin position for 10-pitch machines and 12 spaces away for 12-pitch machines.

d) Move carriage to right margin position and check the following line lock conditions:

1) All character key levers are locked
2) Single space bar is locked
3) Tabulator bar or all decimal tabulator keys are locked.

CARRIAGE RELEASE WITH MARGIN SETTING LEVERS

- Fully rotate right margin setting lever and check the following sequence:

1) Margin stop releases from margin rack
2) Carriage is released

- Repeat above test with left margin setting lever.

MARGIN FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
1) MARGIN STOPS AND MARGIN SETTING LEVERS	
Margin stops fail to set	50-51-54-55-57-61
It is not possible to release carriage with margin setting levers	52-53
Margin stops do not release from rack	52
2) PARAGRAPH INDENTATION AND MARGIN RELEASE	55-62-63
With right margin stop positioned at right limit stop, it is not possible to strike another character key when margin release key is depressed	60
3) JAMMED TYPE BAR RELEASE	64
4) BANKING	
Banking is incorrect only at "0" position of carriage	58-59
Banking is incorrect at any carriage position	17-21-23-56-57
5) LINE LOCK	
With right margin stop positioned at right limit stop, it is not possible to strike another character key when margin release key is depressed	60
Tabulation bar is not locked when in a line lock position	65-73
Space bar is not locked when in a line lock position	65-70-68-68a
Keyboard is not locked when in a line lock position	65-66-69

BACK SPACE TEST

BACK SPACE

- Check that when back space key is depressed, the carriage moves only one space. Depress key both slowly and quickly, and at both ends and center of carriage.

TABULATION TEST

TAB SET AND CLEAR TABULATION

- Depress tab clear key and move carriage its entire travel. Set at least 4 tab stops at various positions and indicate each tab stop position by typing a period.

  Bank carriage and tabulate to determine that each tab stop is set and that carriage stops in exact positions.

  If machine is equipped with decimal tabulation, perform this test with each of the eight tabulator keys.

- Move carriage to right margin and check if tabulator bar (or all decimal tabulator keys) are locked.

BACK SPACE FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
1) BACK SPACE FAULTS	23-74-75

TABULATOR AND DECIMAL TABULATOR FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
1) TAB SET	
Stops are set incorrectly	78
Tab set fails completely	76-77-78-79a
2) TAB CLEAR	78-79
3) TABULATION	
Tabulation fails	80-81-82
Tabulator bar or decimal key levers are locked at other than line lock position	65-71-72
With carriage at right margin, tabulator bar or decimal keys are not locked	65-73
Tabulation is noisy	27
Tabulation registration is incorrect	17-21-31-80-81-82-83-84-85-99
Tabulator bar or decimal keys do not return to rest	85a-86

MISCELLANEOUS TESTS

CARRIAGE RELEASE BUTTONS - Depress the two carriage release buttons individually and check that carriage moves freely throughout its entire travel.

CARD GUIDE CARRIAGE POSITIONING SCALE - With left margin stop positioned at left limit stop, the center line on card guide must align with numeral "0" on the carriage positioning scale.

ALIGNING SCALES - Type a row of lower case i's (i) and verify their correct alignment with graduations of aligning scales.

PLATEN CLAMPS - Check that both left and right platen clamps engage platen bushings with a slight pressure.

MISCELLANEOUS FAULTS	CHECKS TO BE PERFORMED (Refer to FRG)
MISCELLANEOUS	
1) CARRIAGE RELEASE	87-88
2) PLATEN CLAMPS	89
3) PAGE END INDICATOR	90
4) CARD GUIDE	91-92-93
5) ALIGNING SCALES	94-95
6) TOUCH CONTROL LEVER	96
7) BELL	97-98
8) PAPER HOLDING BAIL	47-47a
9) RIBBON BRAKE	10-10a
10) JAMMED TYPE BAR RELEASE	64
11) MOVEMENT OF CARRIAGE	
Carriage binds only at certain points	20-21-49-55-98-99
Carriage binds throughout its entire travel or most of its travel	20-21-27-31-86-93-95-99
Carriage is not held by escapement	23
12) NOISE	
Movement of carriage is noisy in both directions	21-31-27-49-93-95-99
Tabulation is noisy	27
Movement of carriage is noisy during carriage return	22
13) INCORRECT LOCKING	
Carriage is locked in both directions of travel, or it locks at certain points when moved in either direction	17-18-24-25-74-79a-86
Carriage is locked in one of its two directions of travel	55-86
Character key levers are locked	65-66-67-68a
Space bar is locked	65-68
Tab bar or decimal tab keys are locked	65-71-72
Segment is locked in lower case	37

COMPLETE CHECK OF MECHANISMS

SECTION	MECHANISM	CHECKS
PRINTING FAULTS	Type action mechanism Print quality Ribbon lift Ribbon feed Ribbon reverse Escapement	1 2-3-4 5-6-7 8-9-10-10a 11-12 13-14-15-16-17-18-19-20-21-22-23
SPACE BAR FAULTS	Space bar Repeat space key	24-25 26-27-28-29-30-31-32
SHIFT FAULTS	Shift Shift lock key	33-34-35-36-37 38-39
LINE SPACE/ PAPER FAULTS	Line space and line space selector Memory line finder Platen variable Paper release lever and feed rollers Paper holding bail Paper pan and front paper deflector	40-41-42 43 44 45-46 47-47a 48-49
MARGIN FAULTS	Margin setting levers Banking, limit stops, margin stops Paragraph indentation and margin release Jammed type bars release Line lock	50-51-52-53 54-55-56-57-58-59-60-61 62-55-63 64 65-66-67-68-68a-69-70-71-72-73
BACK SPACE FAULTS	Back space	74-75
TABULATION FAULTS	Tab set and tab stop positioning Tab clear Tabulator or decimal tabulator	76-77-78-79a 79 80-81-82-83-84-31-85-86
MISCEL-LANEOUS FAULTS	Carriage release buttons Platen clamps Page end indicator Card guide and bail scale Aligning scales Touch control lever Bell Carriage movement	87-88 89 90 91-92-93 94-95 96 97-98 99

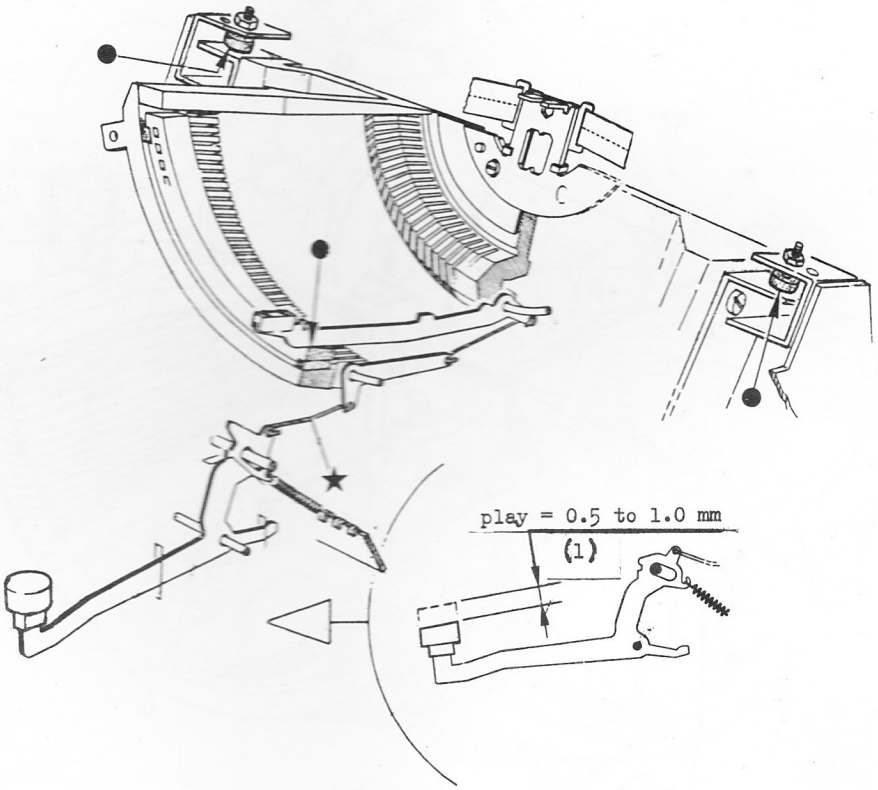
LINEA 98

PART 2

FAULT-REPAIR GUIDE

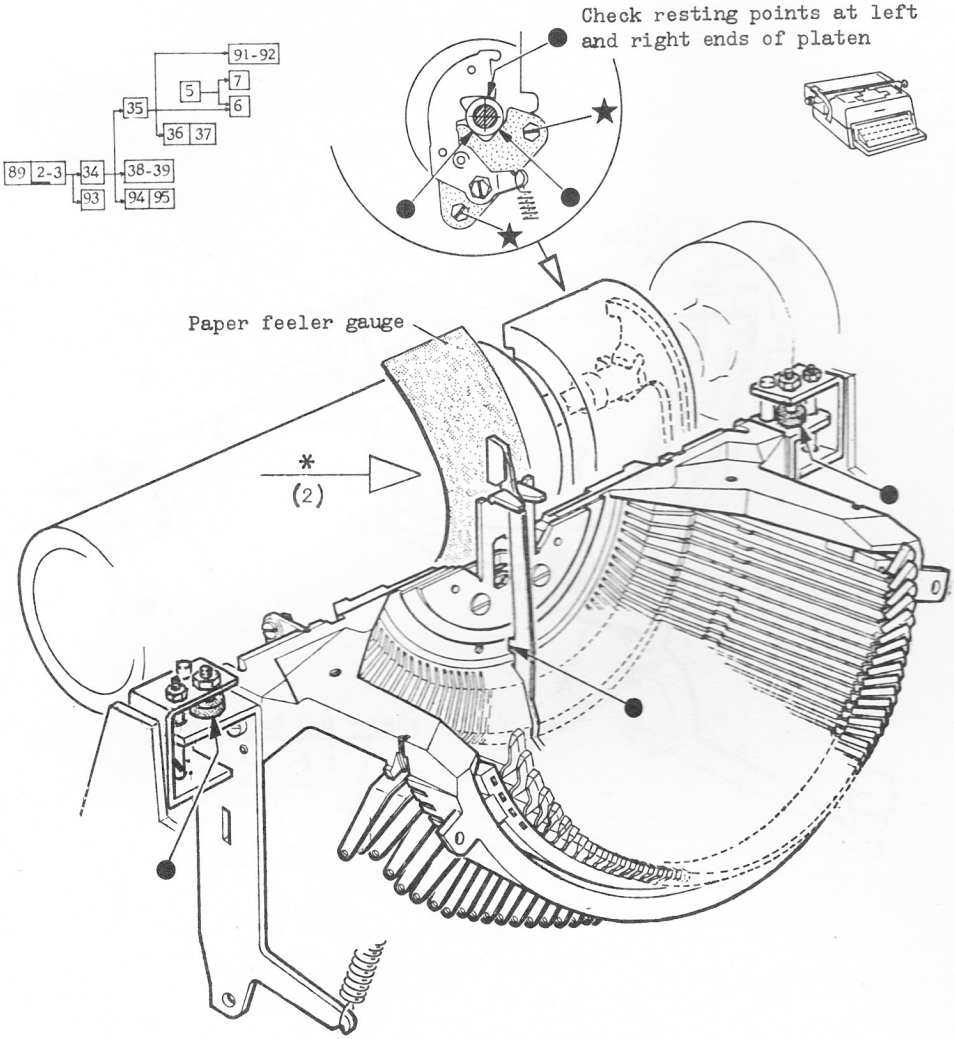
TYPE ACTION MECHANISM (KEY LEVER PLAY)

1



- Segment in lower case.
- To check play, manually hold type bars against nest and depress each key.

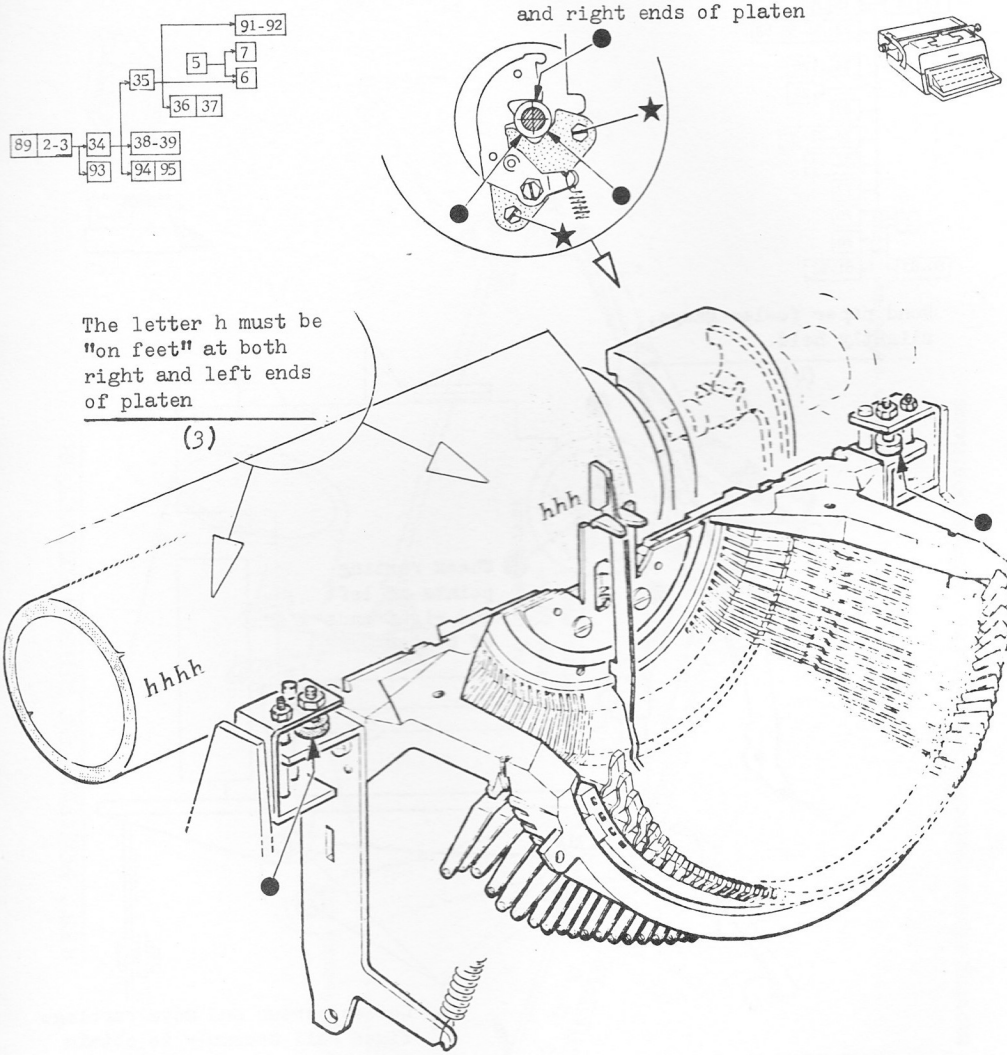
PLATEN PARALLELISM



- Segment in lower case.

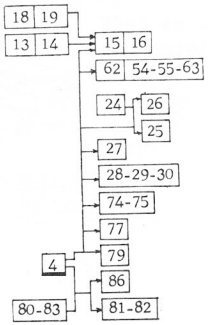
* With a type bar held against segment stop ring, a bond-paper feeler gauge must be held with the same pressure at both ends of platen.

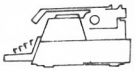
PLATEN PARALLELISM IN HEIGHT (TYPE ON FEET)

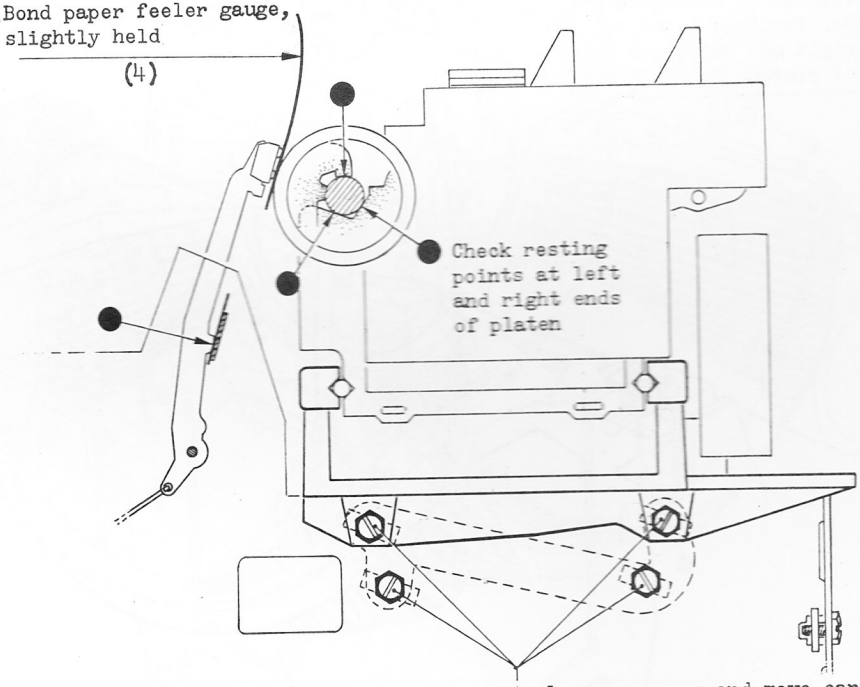


- Segment in lower case.
- Strike the letter "h" several times at both ends of platen.

RING AND PLATEN



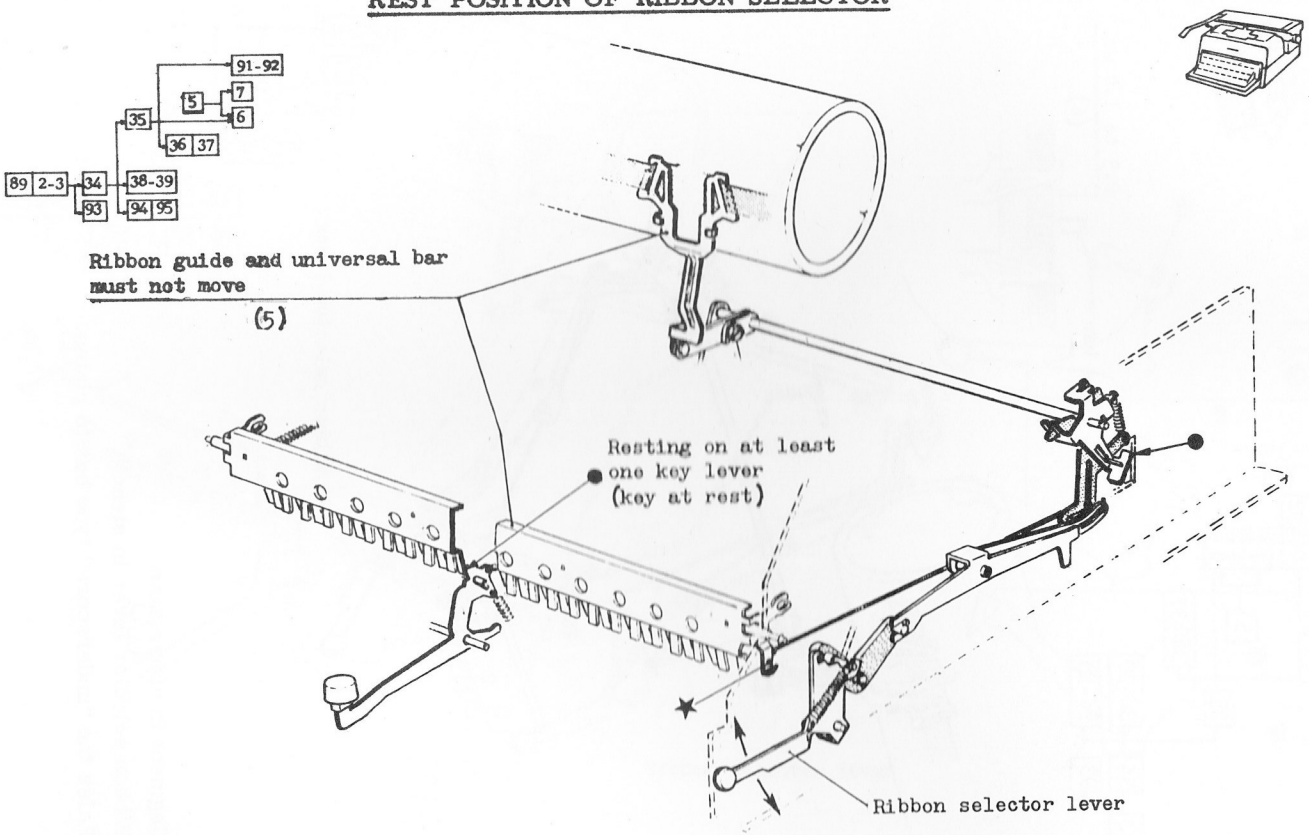




★ Loosen screws and move carriage fixed rail assembly to obtain this condition for the majority of type bars. Individual type bars which do not meet this condition should be adjusted according to type alignment procedure.

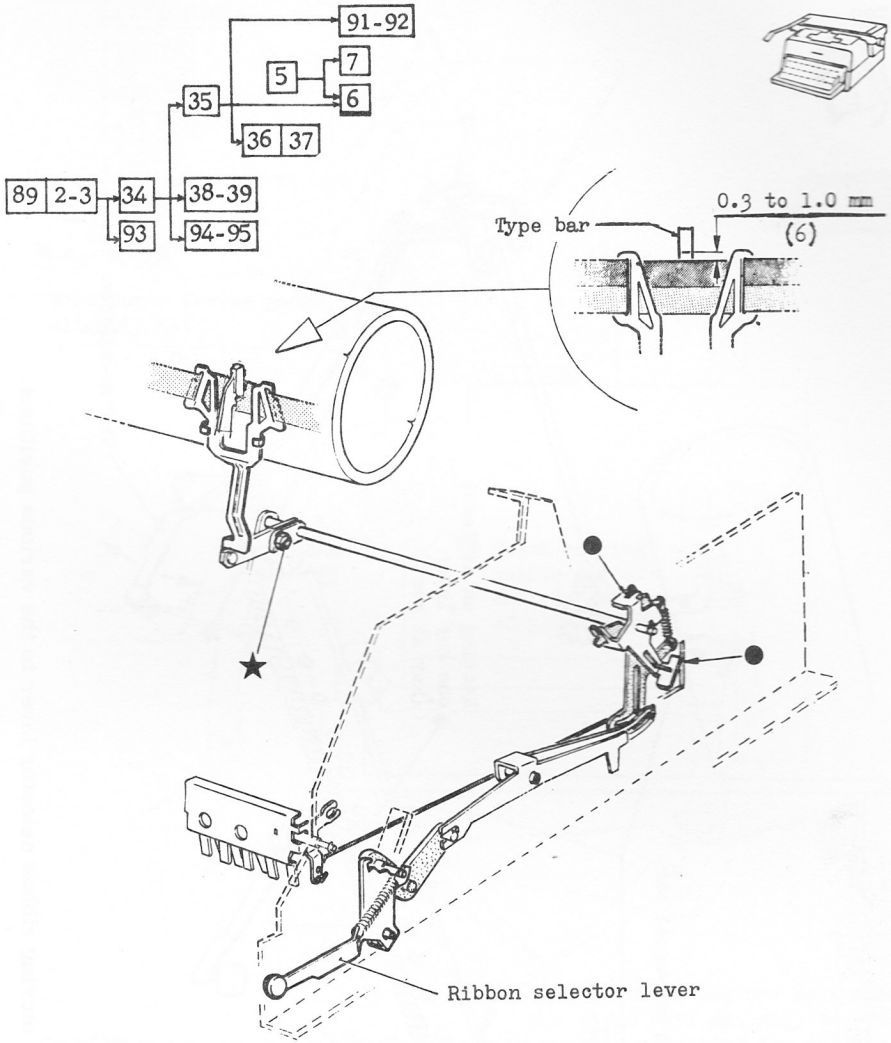
- Segment in lower case.
- Make sure that each type bar, when held against segment stop ring, has a slight hold on the bond-paper feeler gauge.

REST POSITION OF RIBBON SELECTOR



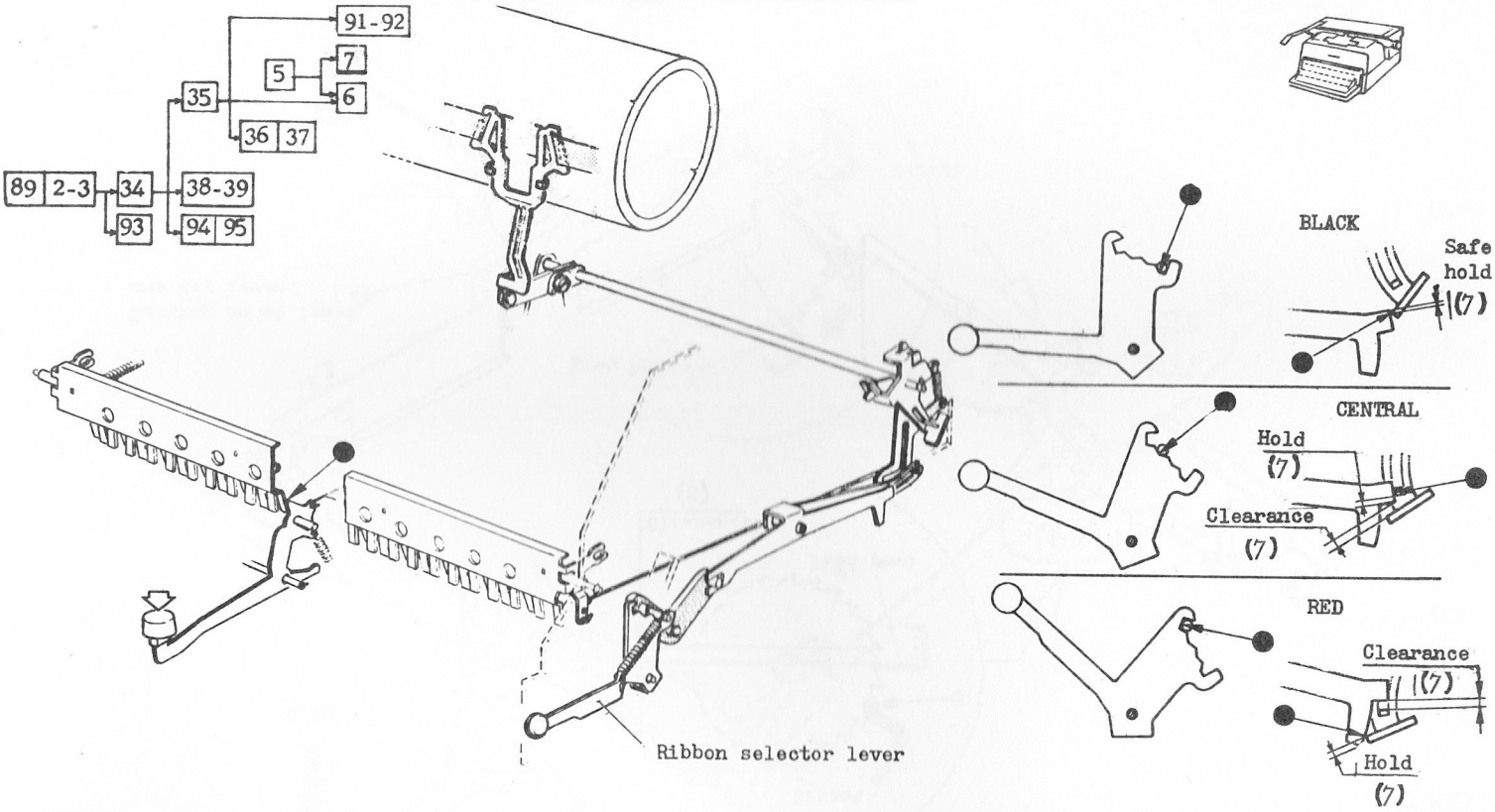
- Check by moving ribbon selector lever to the various positions.

REST POSITION OF RIBBON GUIDE



- Segment in upper case
- Ribbon selector lever in stencil.
- Raise the "underscore" type bar to platen.

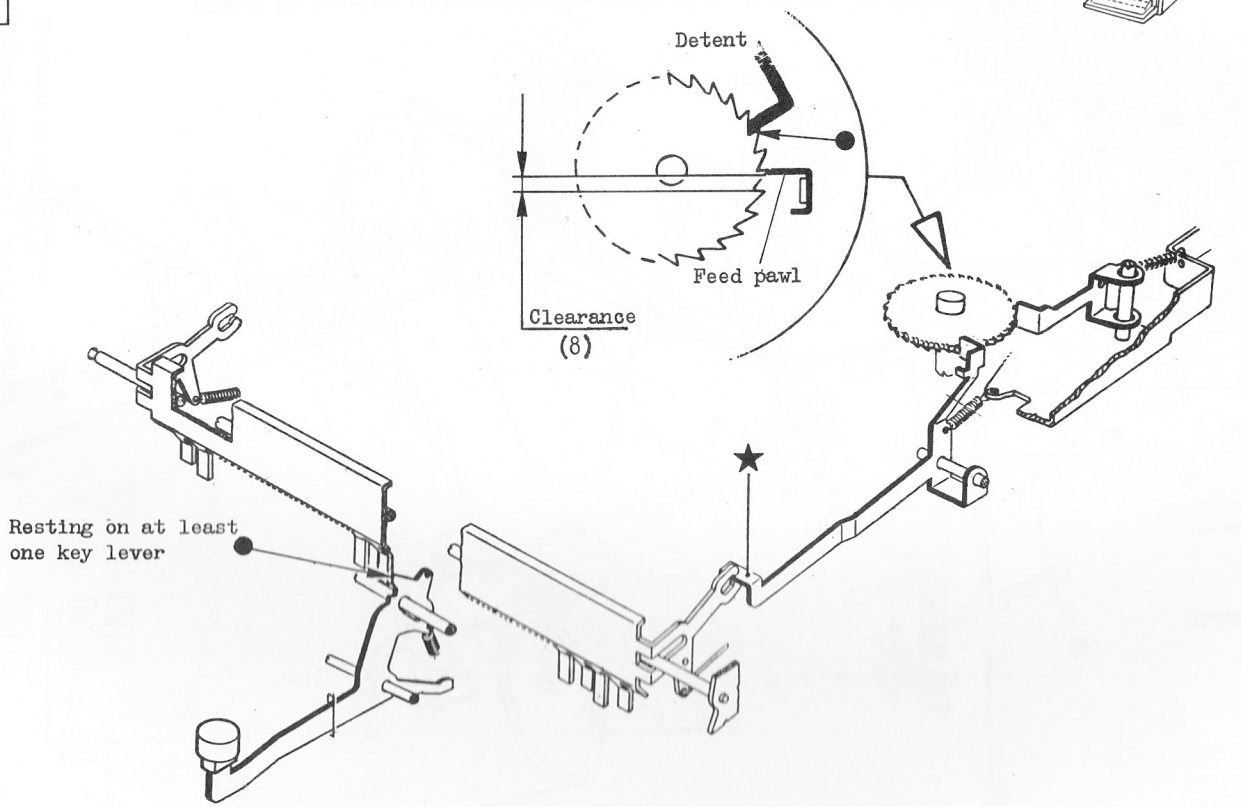
BICHROME SELECTION



Check by moving ribbon selector lever to each of the positions indicated in diagram and by depressing a key lever.

8 - 9

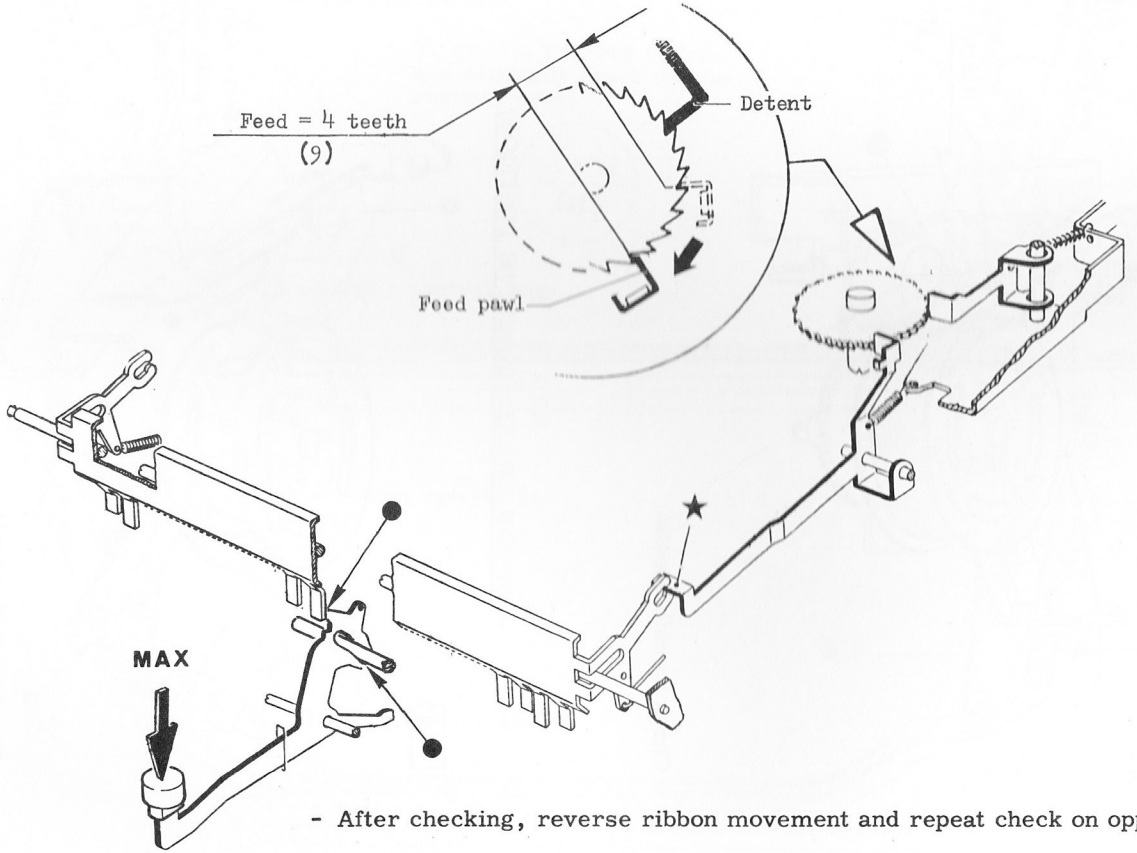
REST POSITION OF RIBBON FEED MECHANISM



- Character keys at rest.
- After checking, reverse ribbon movement and repeat check on opposite side.

ACTIVATED POSITION OF RIBBON FEED MECHANISM

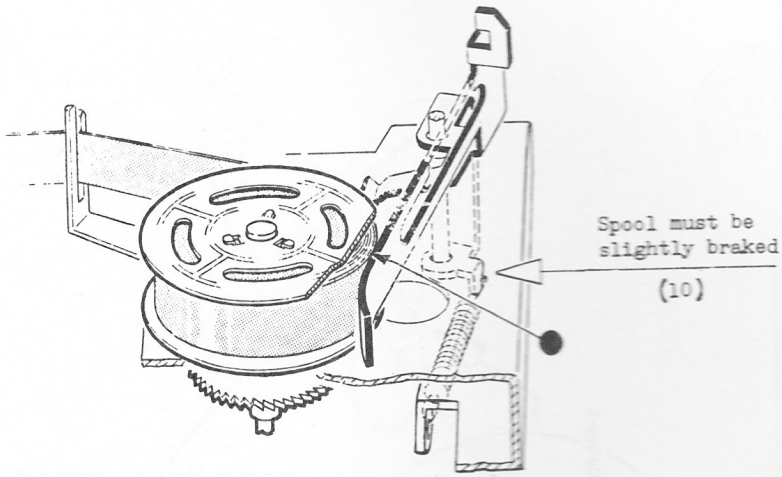
8 - 9



- After checking, reverse ribbon movement and repeat check on opposite side.

RIBBON BRAKE (ACTIVE POSITION)

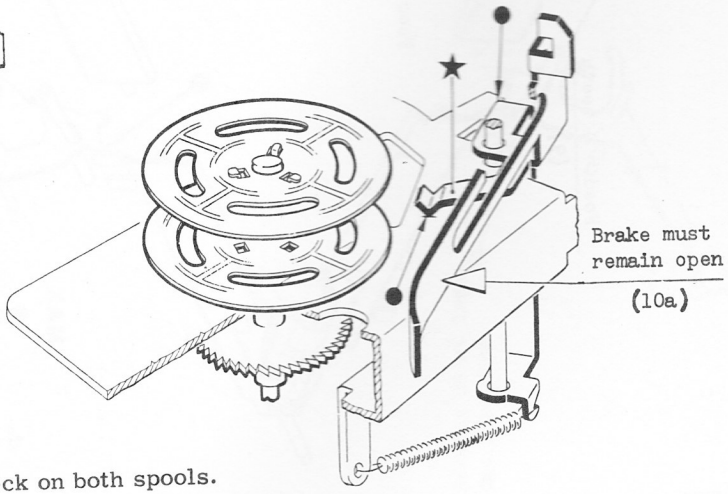
10



- Check on both spools.

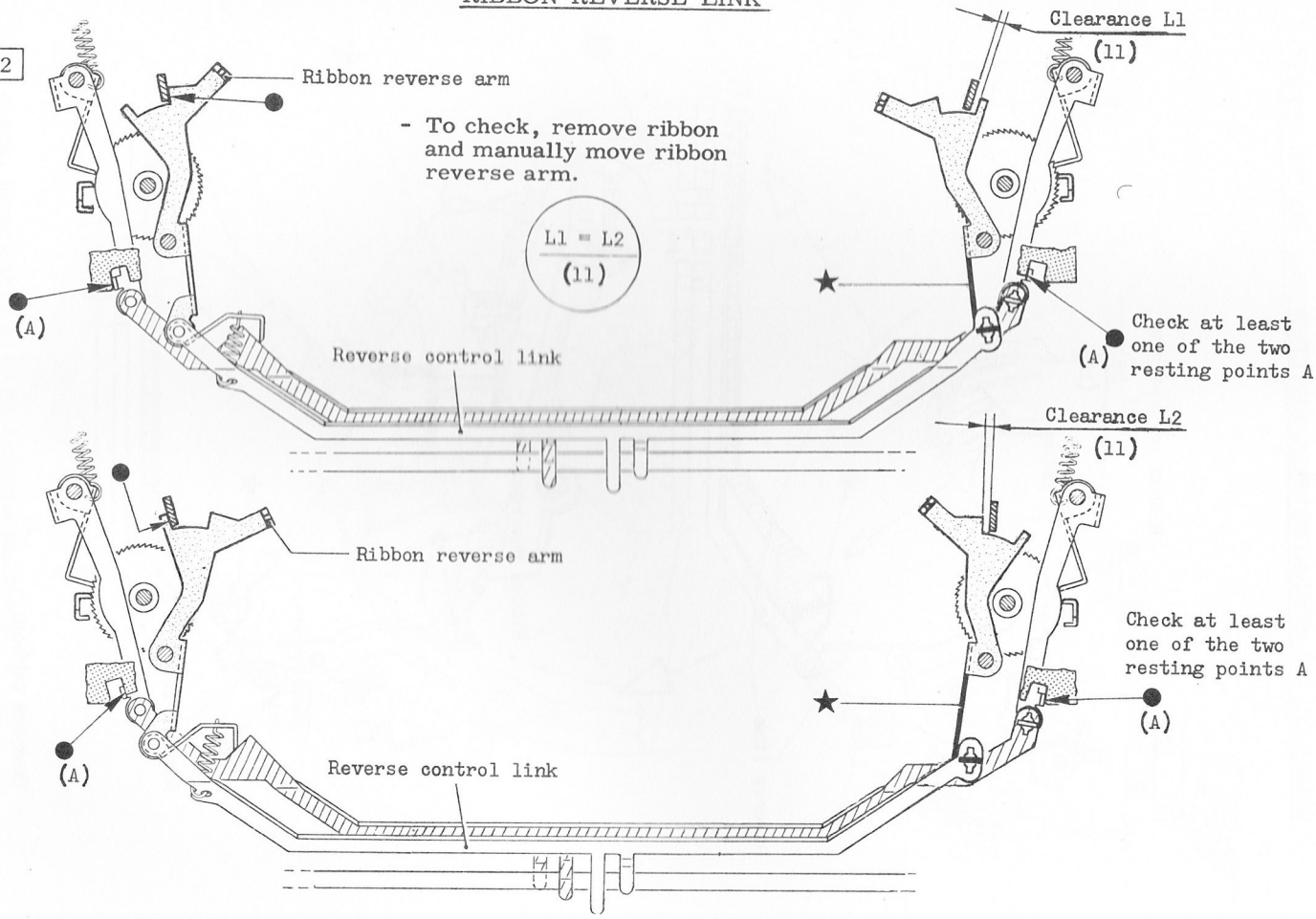
RIBBON BRAKE (INACTIVE POSITION)

10 a

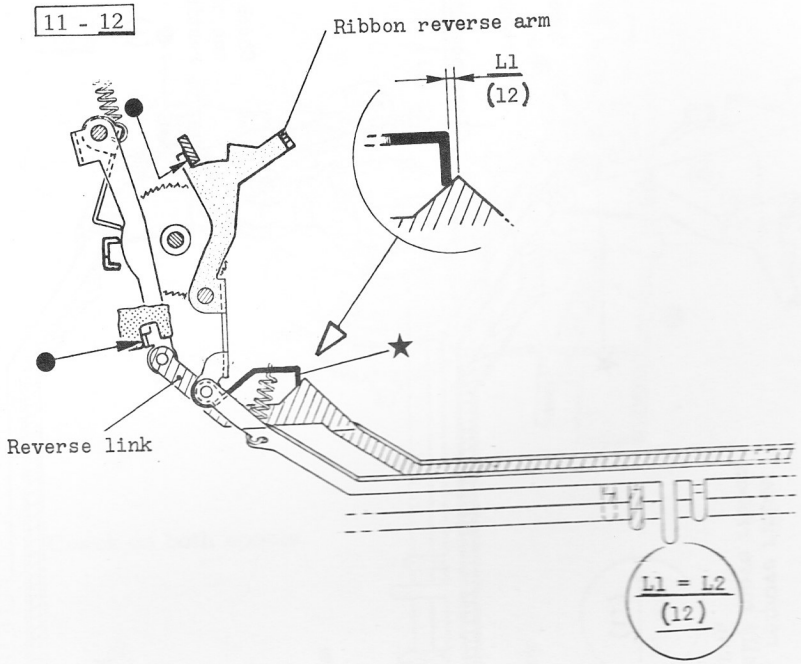


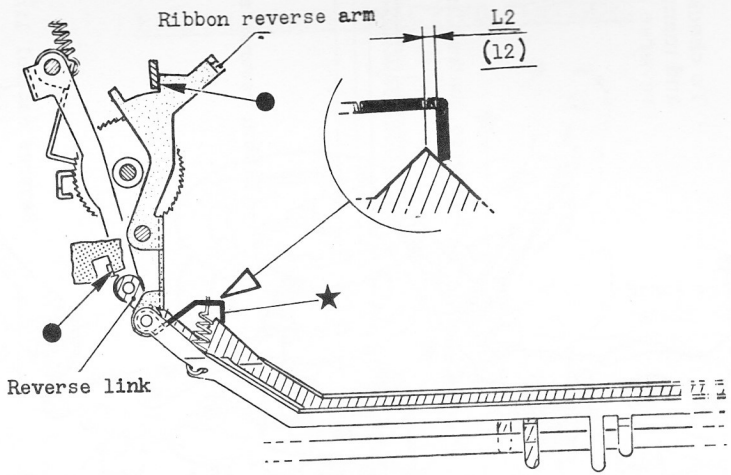
- Check on both spools.

RIBBON REVERSE LINK



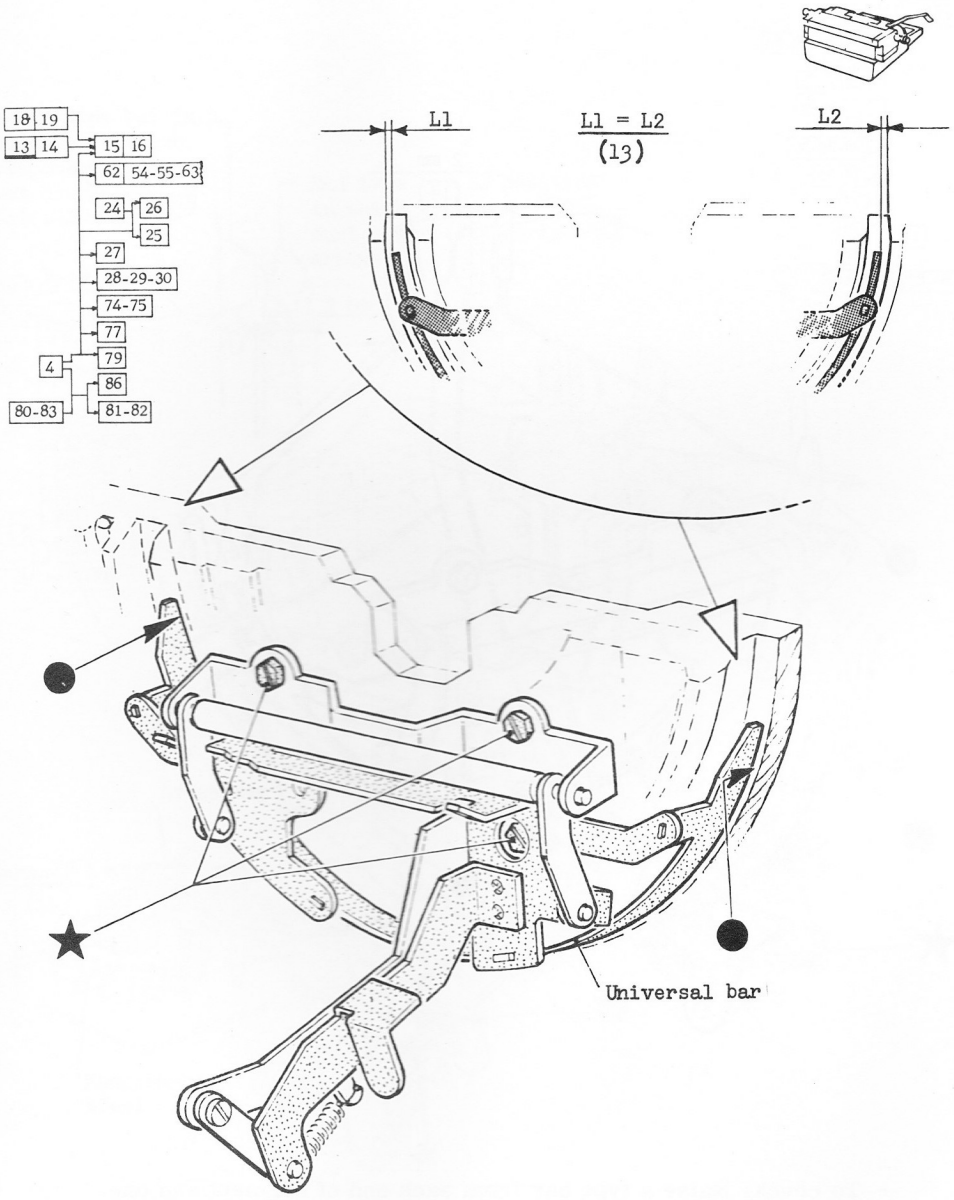
11 - 12





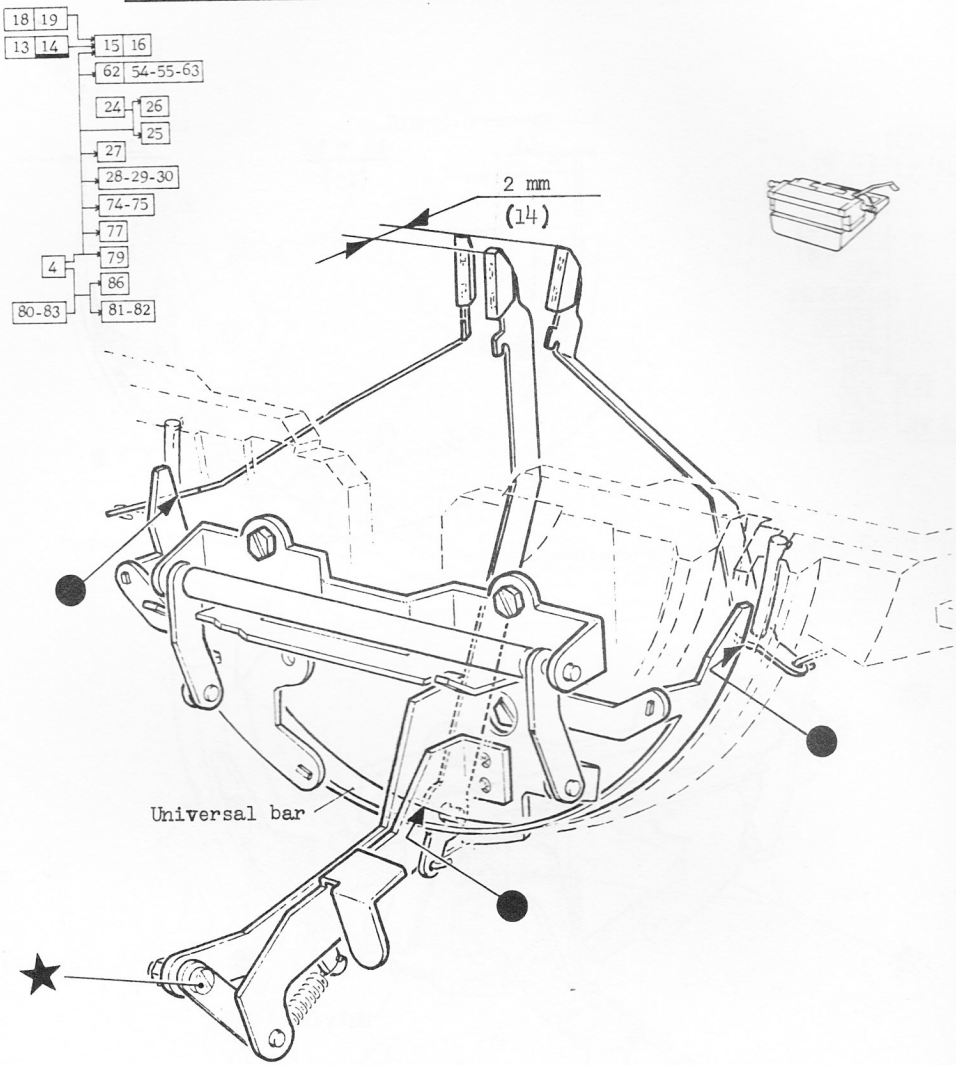
- Remove ribbon.
- To check, manually move ribbon reverse arm to obtain the conditions indicated.

CENTERING OF UNIVERSAL BAR IN RELATION TO SEGMENT



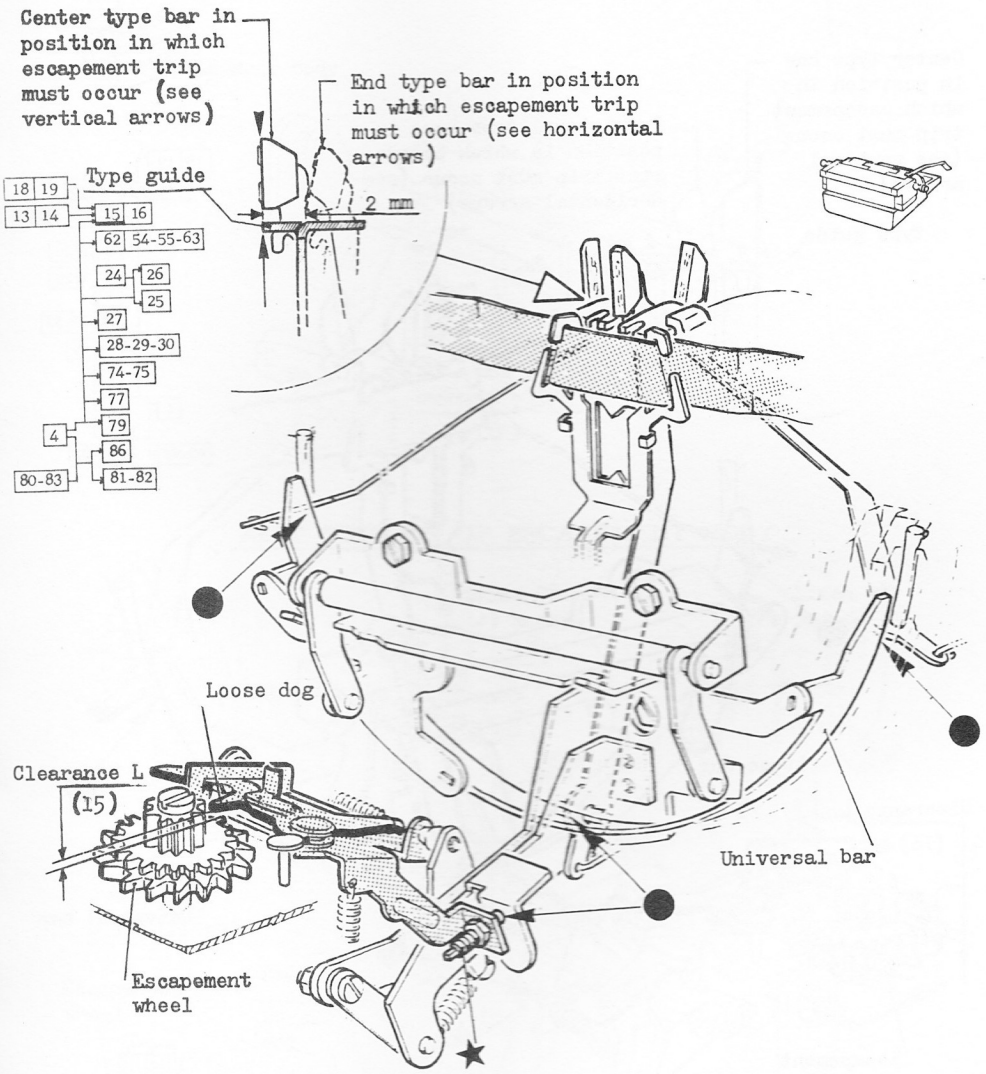
- To check, move carriage to its extreme positions.

POSITION OF UNIVERSAL BAR IN RELATION TO TYPE BARS



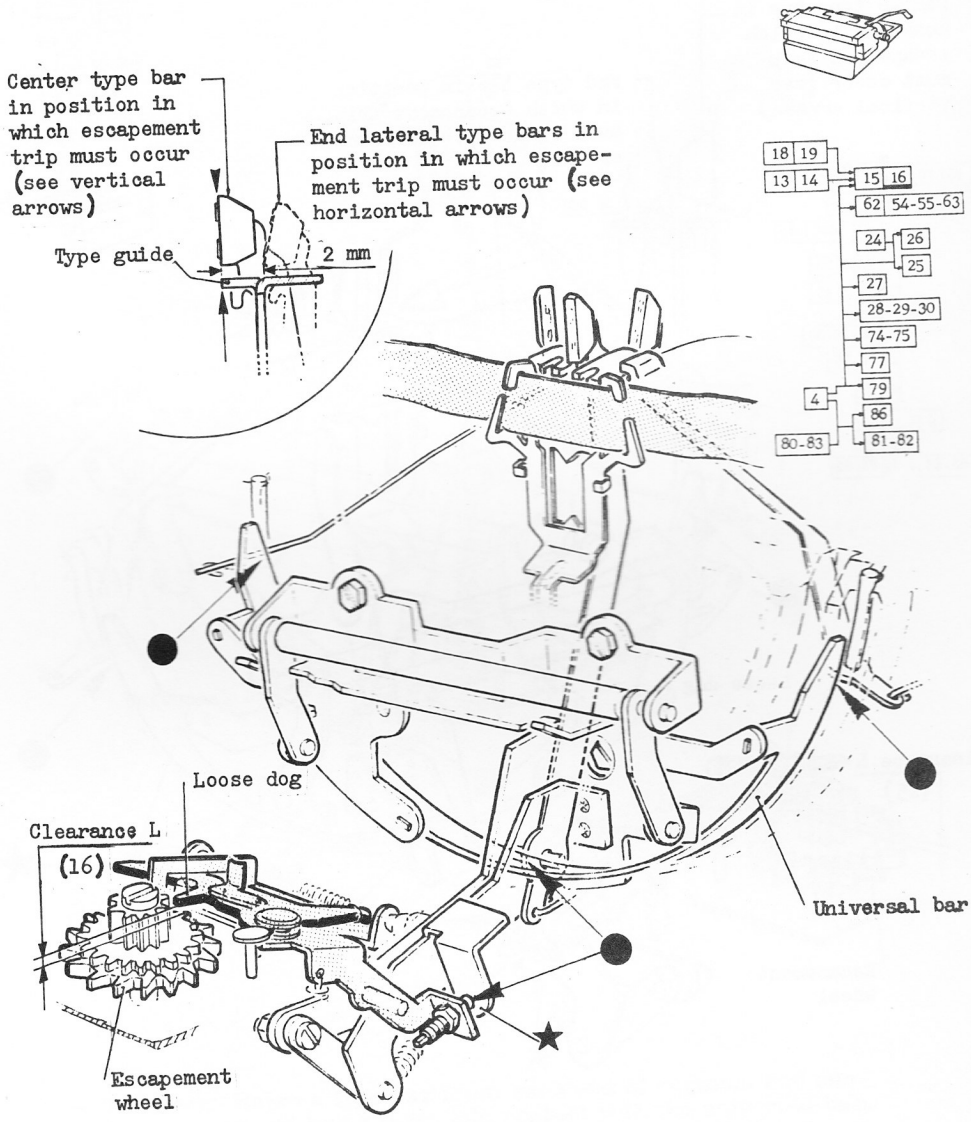
- To check: Raise a type bar from each end of segment and one from center and bring them into contact with the universal bar. Adjust eccentric so type blocks align as shown in diagram.

ESCAPEMENT TRIP (UPPER CASE)



- Segment in upper case.
- Trip should occur when type bars are manually raised to positions shown in diagram.

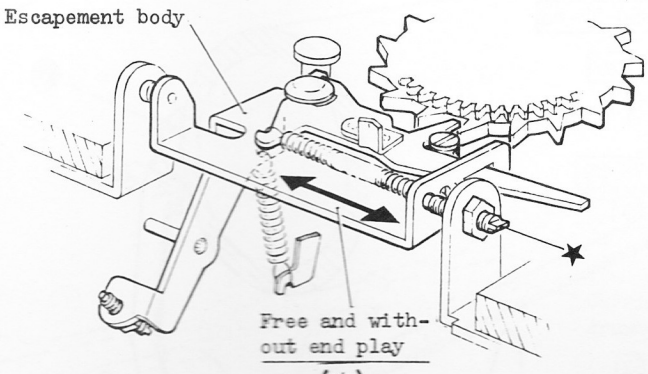
ESCAPEMENT TRIP (LOWER CASE)



- Segment in lower case.
- Trip should occur when type bars are manually raised to positions shown in diagram.

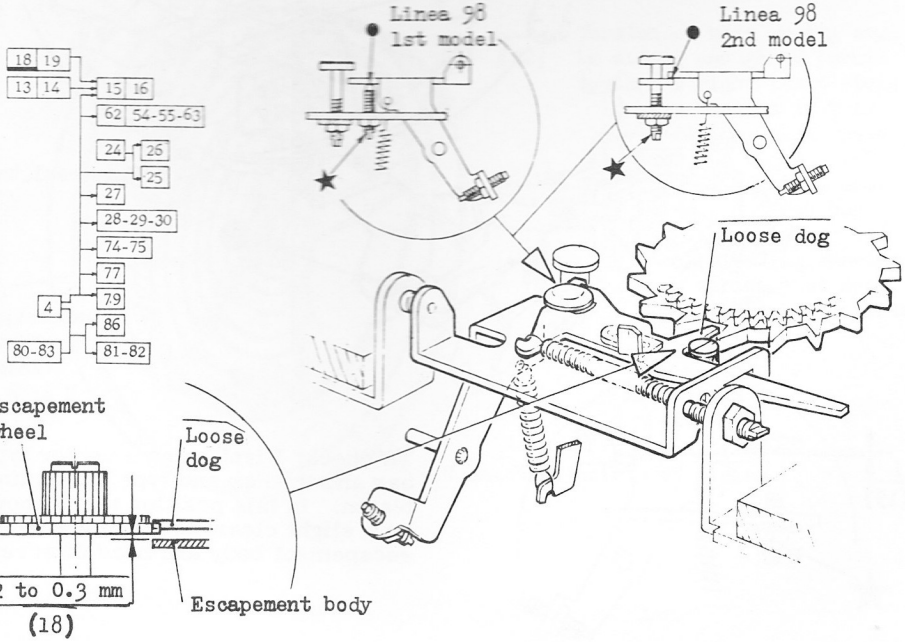
END PLAY OF ESCAPEMENT BODY

17



(17)

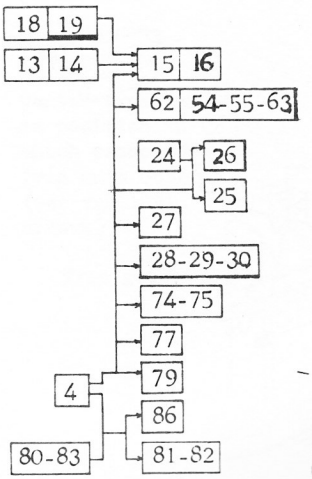
REST POSITION OF ESCAPEMENT BODY

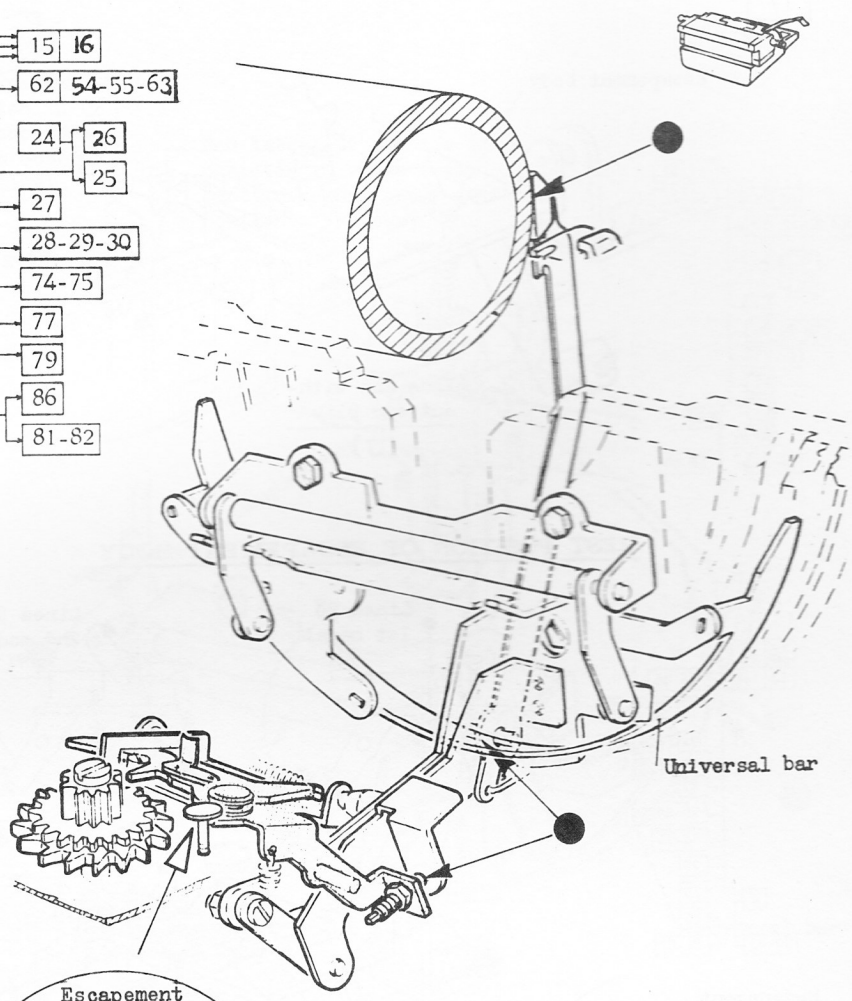


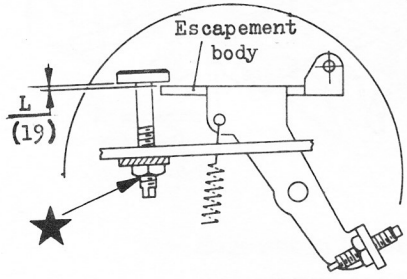
(18)

- To check, remove carriage.

ACTIVATED POSITION OF ESCAPEMENT BODY



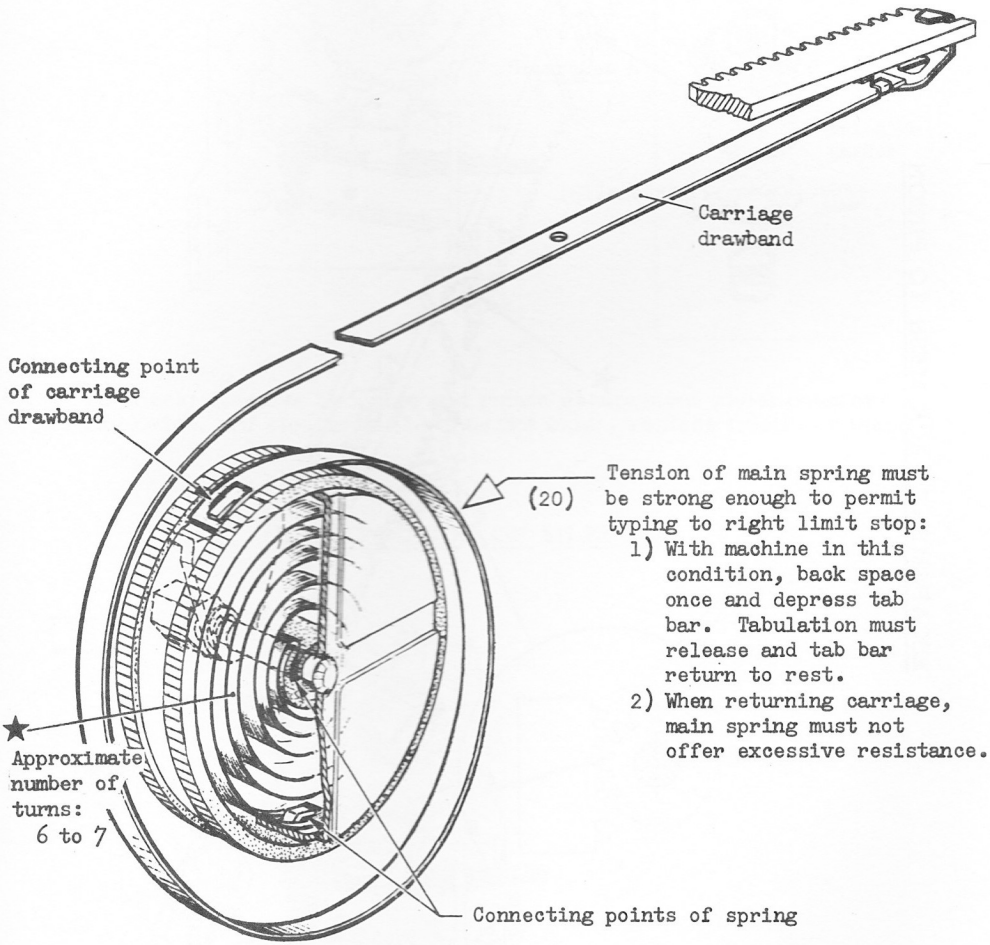




- To check: First raise a center type bar and then an end type bar against platen. In this position there should be a slight clearance (L) between escapement body and head of screw.

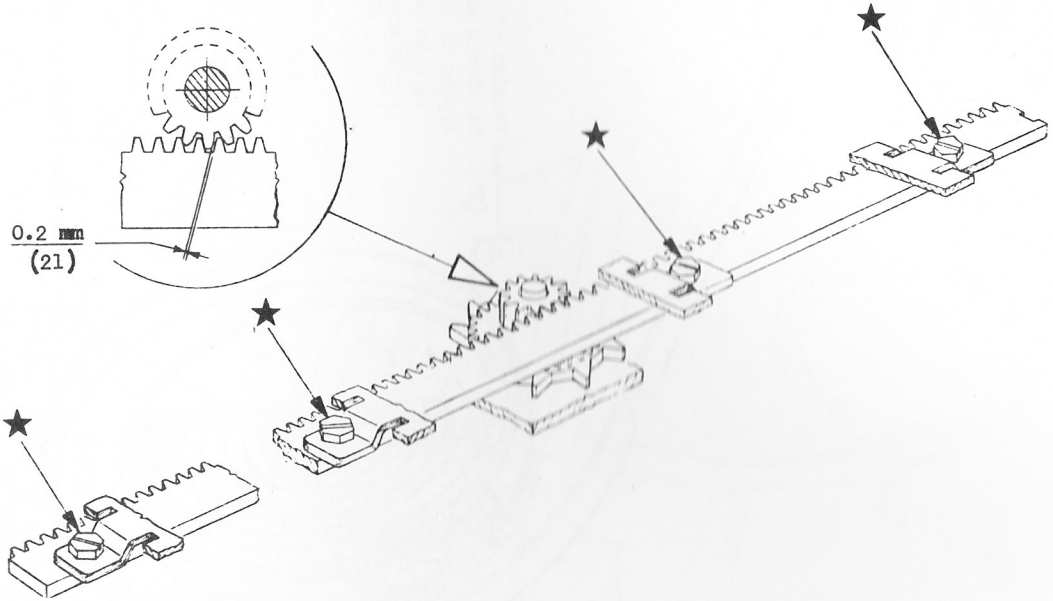
MAIN SPRING TENSION

20


Carriage drawband
Connecting point of carriage drawband
(20)
Tension of main spring must be strong enough to permit typing to right limit stop:
1) With machine in this condition, back space once and depress tab bar. Tabulation must release and tab bar return to rest.
2) When returning carriage, main spring must not offer excessive resistance.
Approximate number of turns: 6 to 7
Connecting points of spring

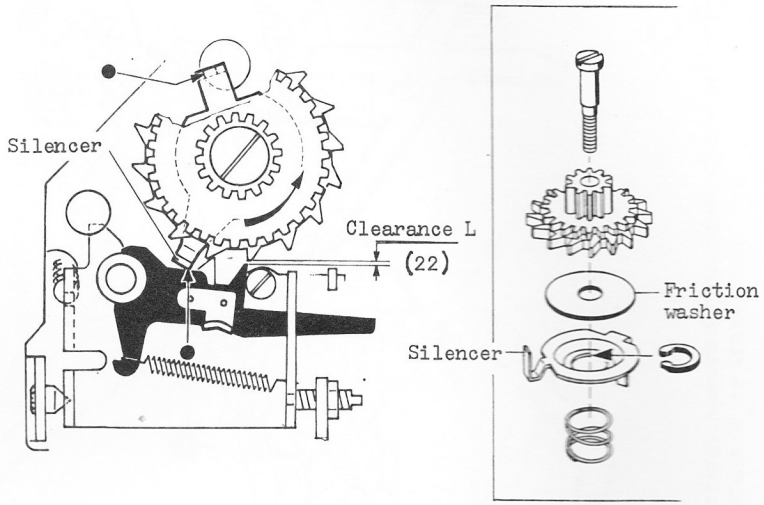
ESCAPEMENT RACK MESH TO PINION

21



POSITION OF SILENCER WITH LOOSE DOG RELEASED

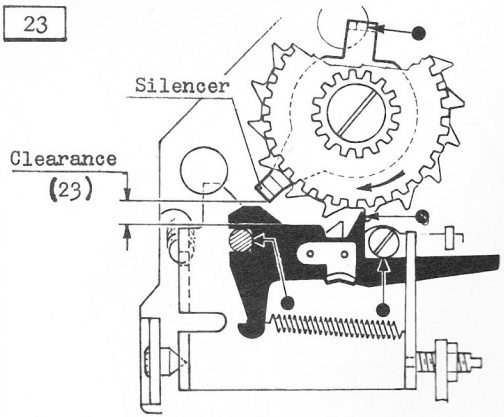
22



- To check: Remove carriage and rotate escapement wheel counter-clockwise. (If clearance (L) does not exist, replace friction washer.)

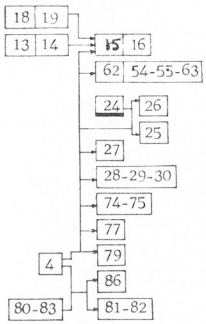
REST POSITION OF SILENCER

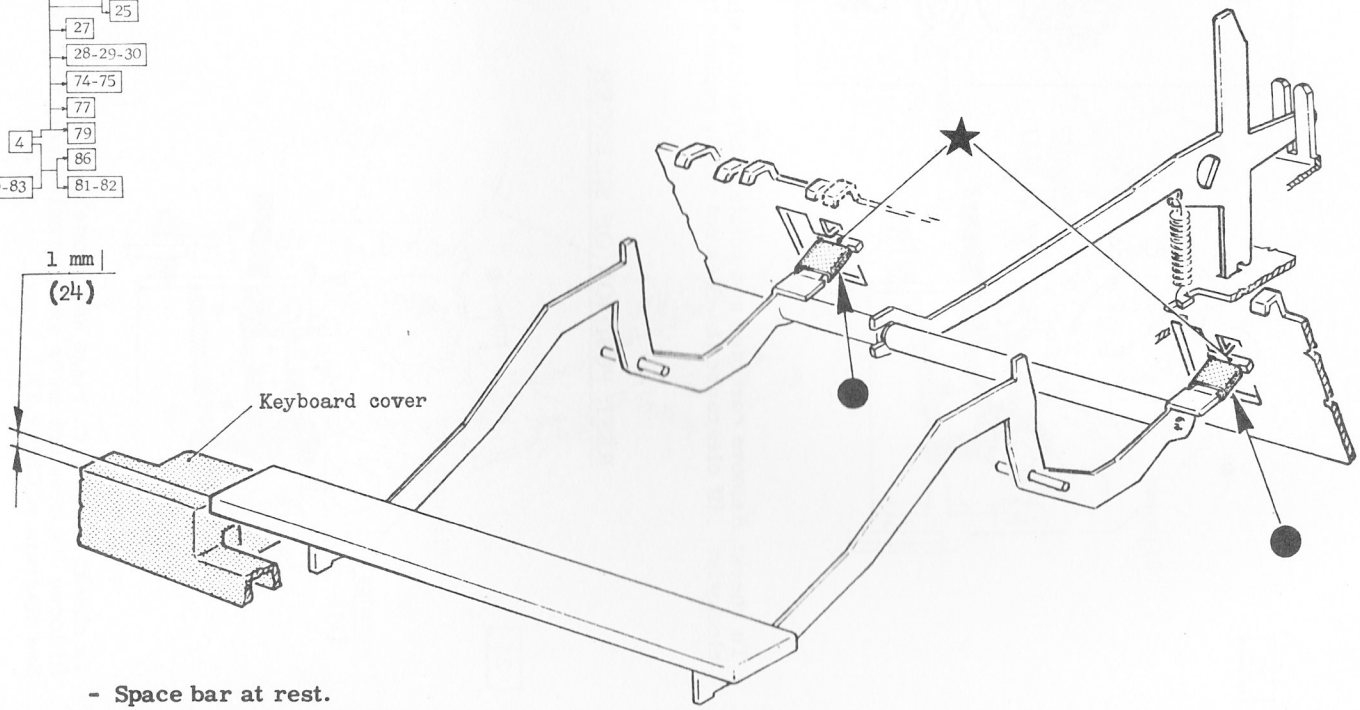
23



- To check: Remove carriage and rotate escapement wheel clockwise. (If loose dog does not enter escapement wheel, replace friction washer. See diagram of Check 22.)

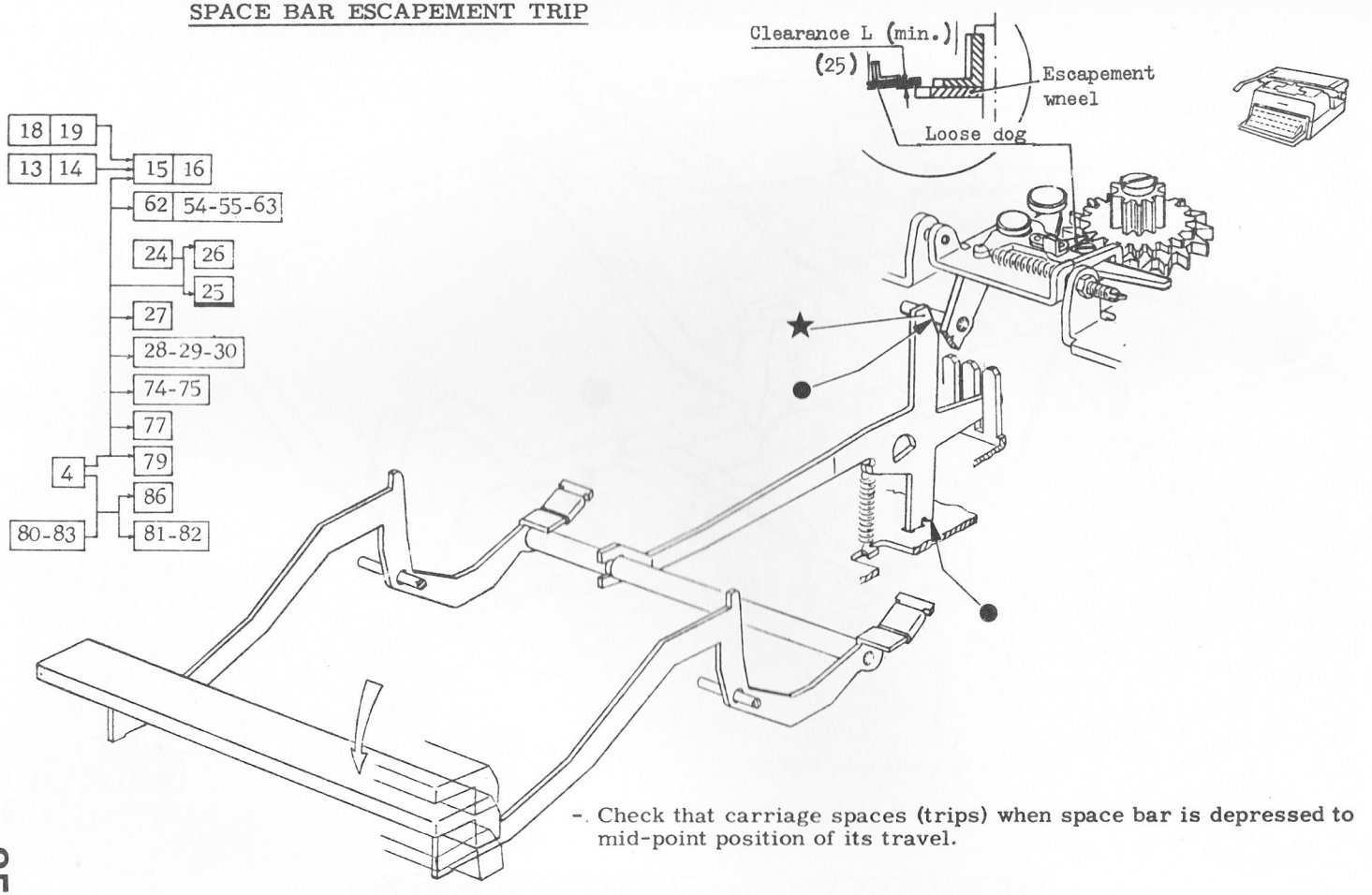
ALIGNMENT OF SPACE BAR TO KEYBOARD COVER





- Space bar at rest.

SPACE BAR ESCAPEMENT TRIP



- Check that carriage spaces (trips) when space bar is depressed to mid-point position of its travel.

ALIGNMENT OF REPEAT SPACE KEY TO SPACE BAR

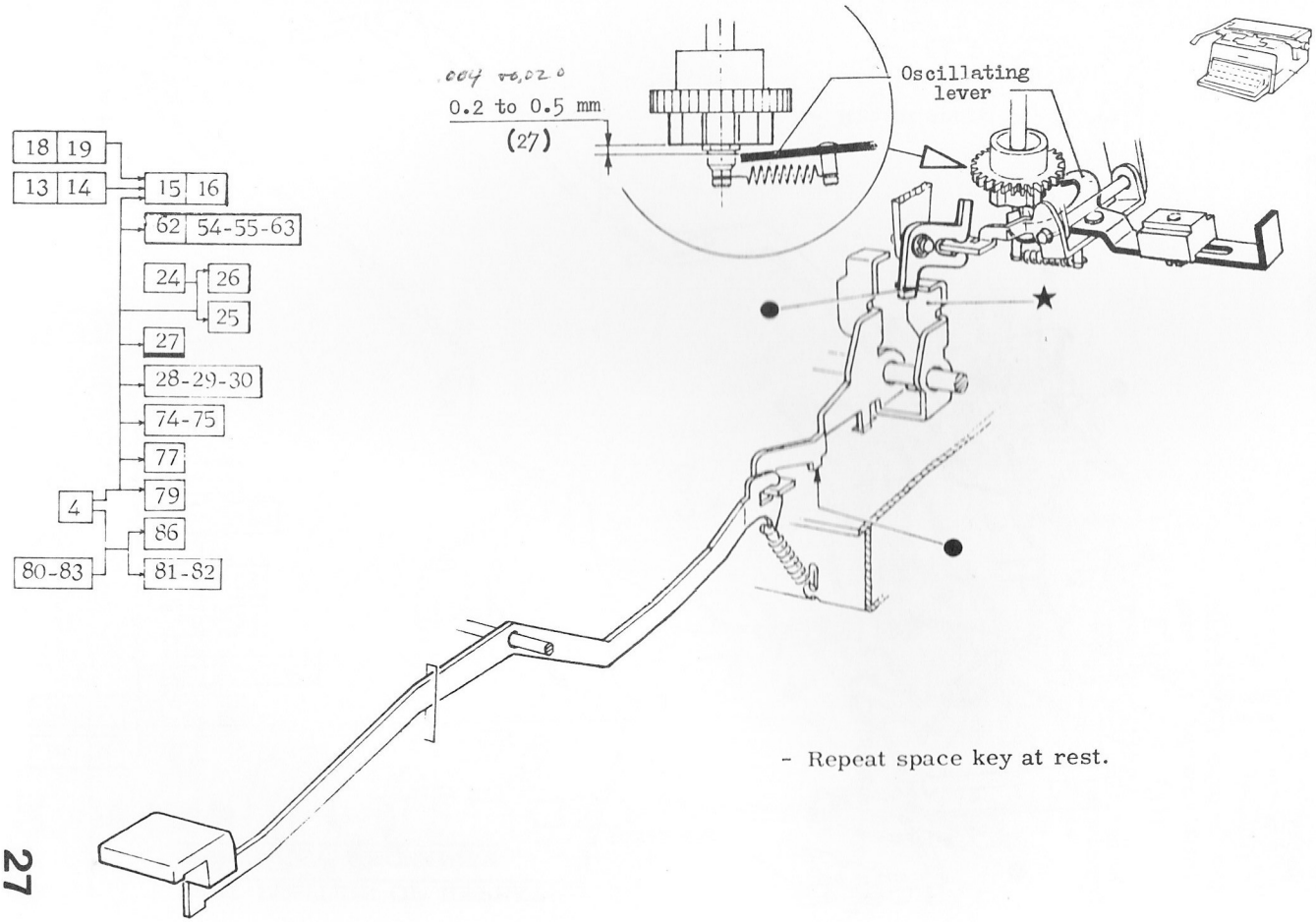
18 19
13 14
15 16
62 54-55-63
24 26
25
27
28-29-30
74-75
77
4 79
86
80-83 81-82

If necessary, form repeat space bar lever just forward of key lever front comb

Alignment
(26)

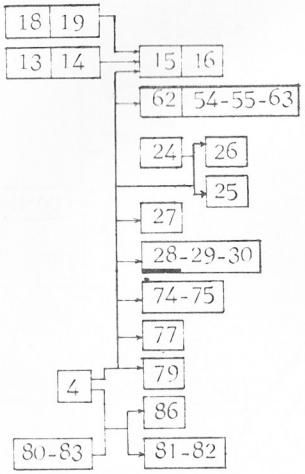
- Space bar and repeat space key at rest.

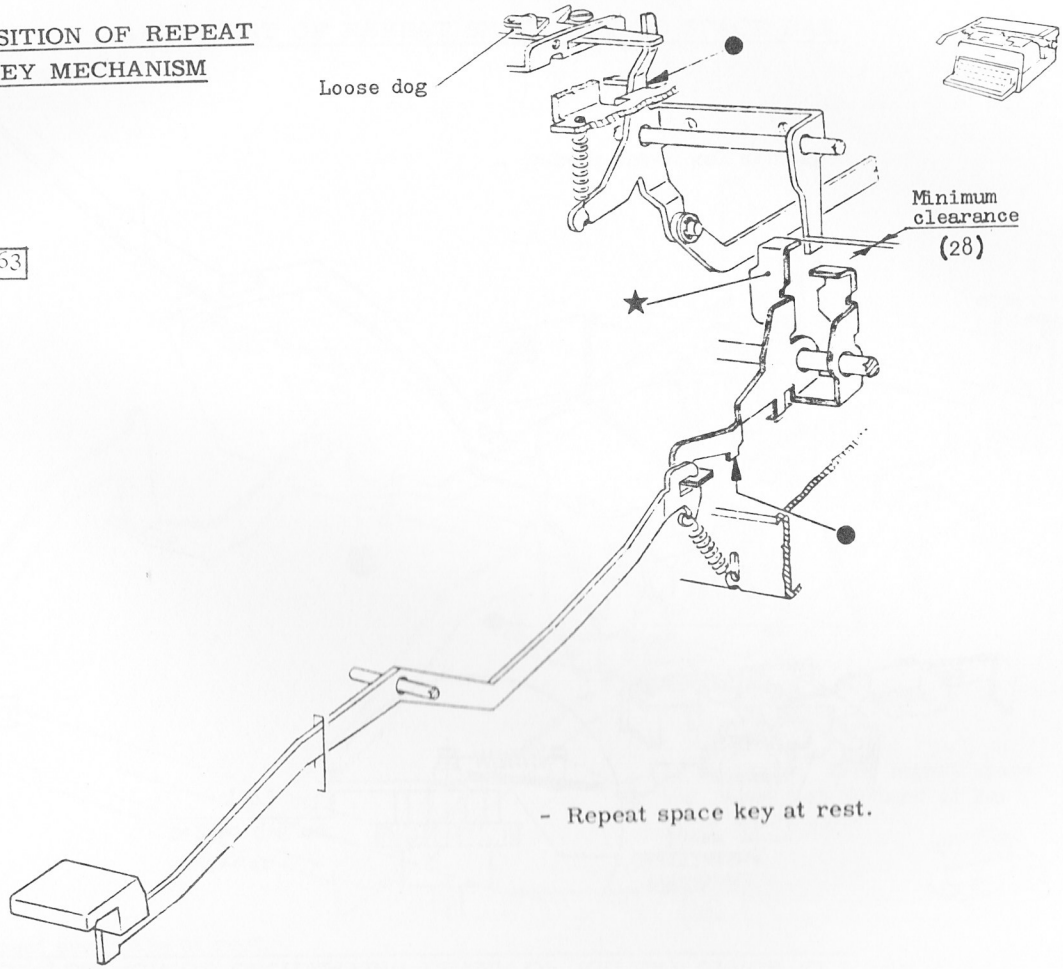
REST POSI ION OF OSCILLATING LEVER OF REPEAT SPACE KEY



- Repeat space key at rest.

REST POSITION OF REPEAT SPACE KEY MECHANISM

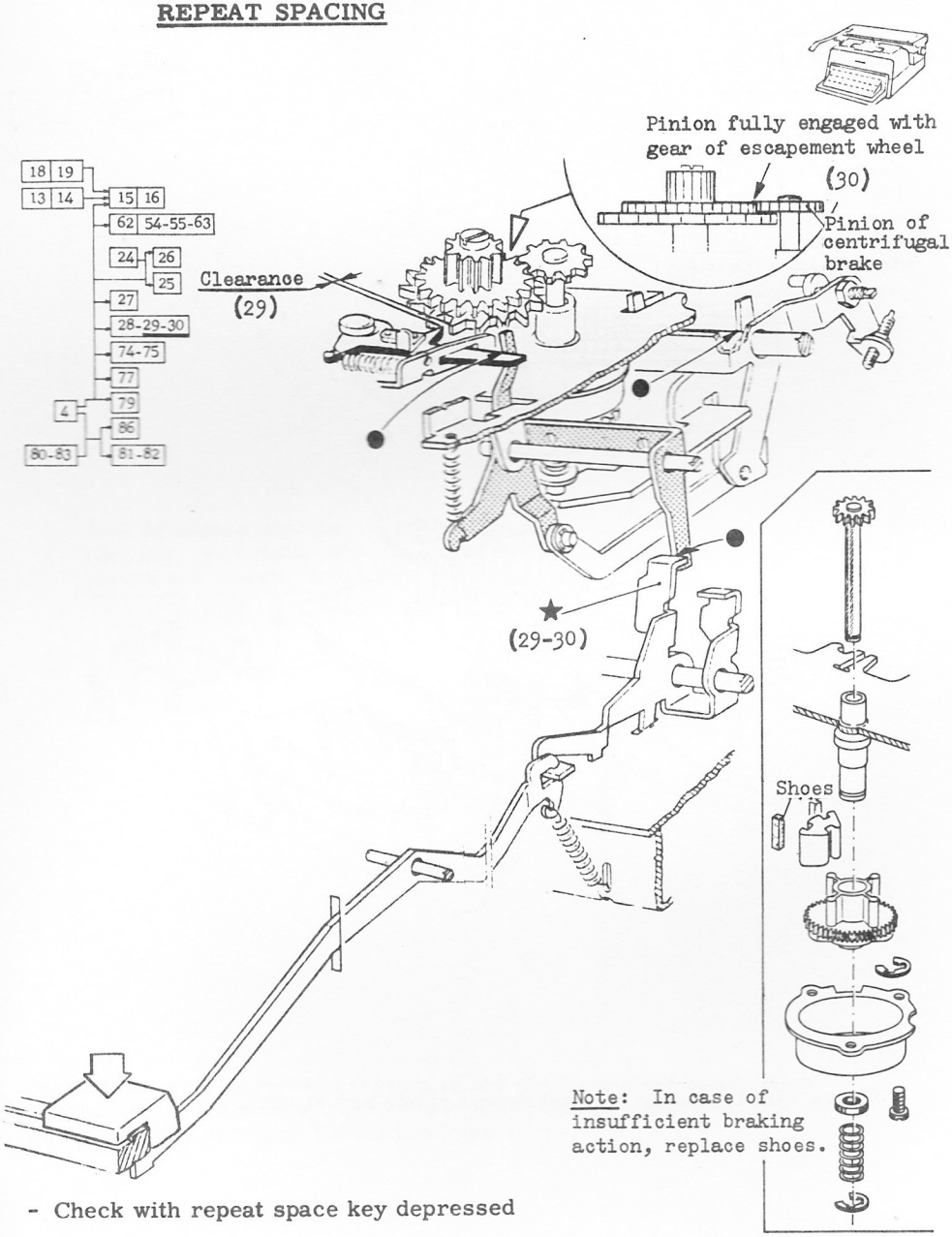




- Repeat space key at rest.

29 - RELEASE OF LOOSE DOG DURING REPEAT SPACING

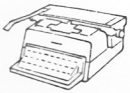
30 - ENGAGEMENT OF CENTRIFUGAL BRAKE DURING REPEAT SPACING

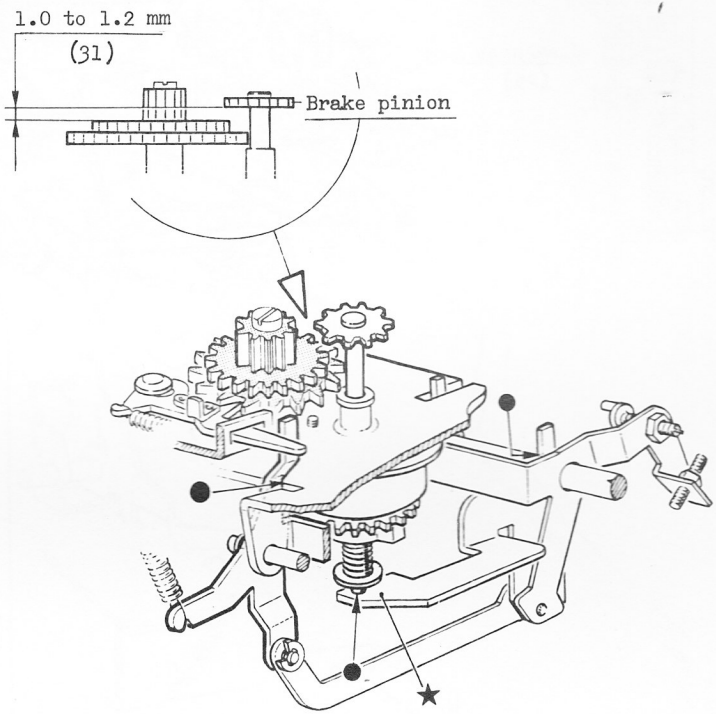


- Check with repeat space key depressed

REST POSITION OF CENTRIFUGAL BRAKE PINION

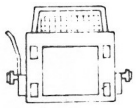
31	84



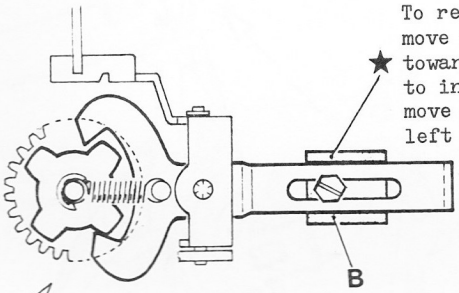


- Check with tabulator bar and repeat space key at rest.

SPEED AND RHYTHM OF CARRIAGE DURING REPEAT SPACING

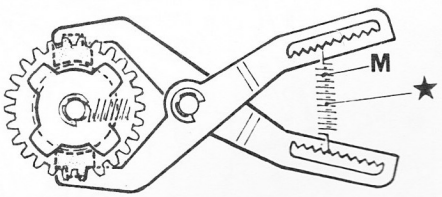


32



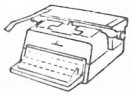
Braking action must be adequate to obtain both rhythm and correct speed

(32)

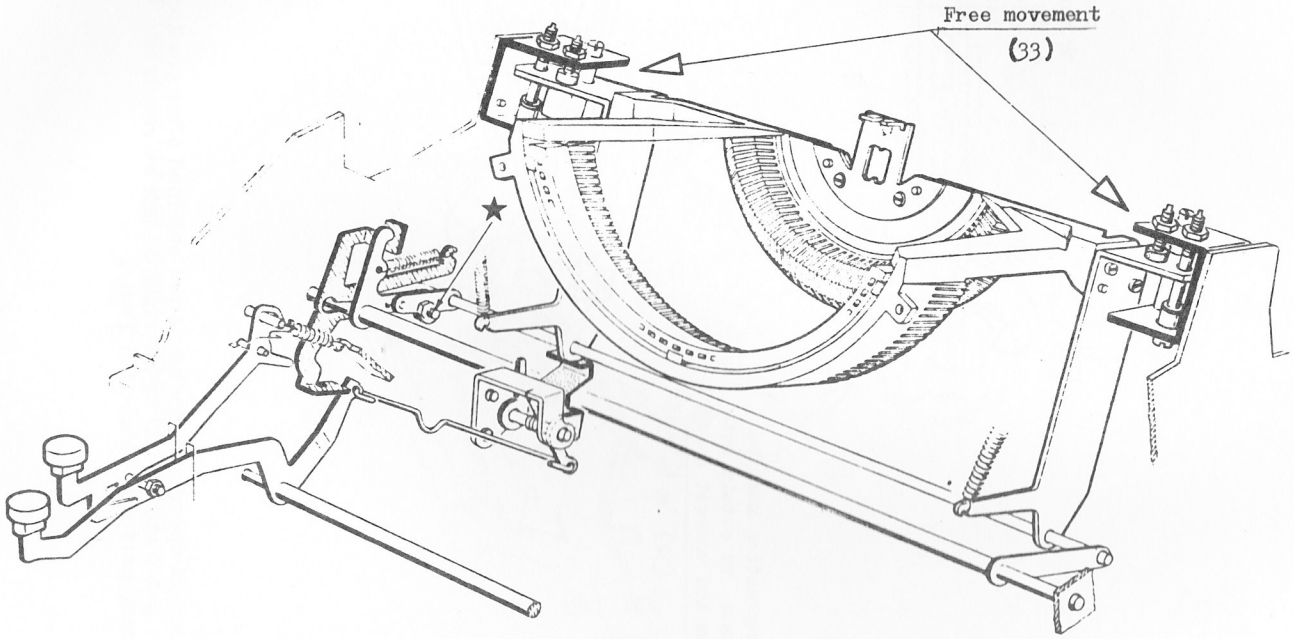


Note: If correct speed and rhythm is not obtained after positioning weight (B), move spring (M) to the right or left as required. (If spring (M) is moved, perform Tabulation Test.)

MOVEMENT OF SEGMENT

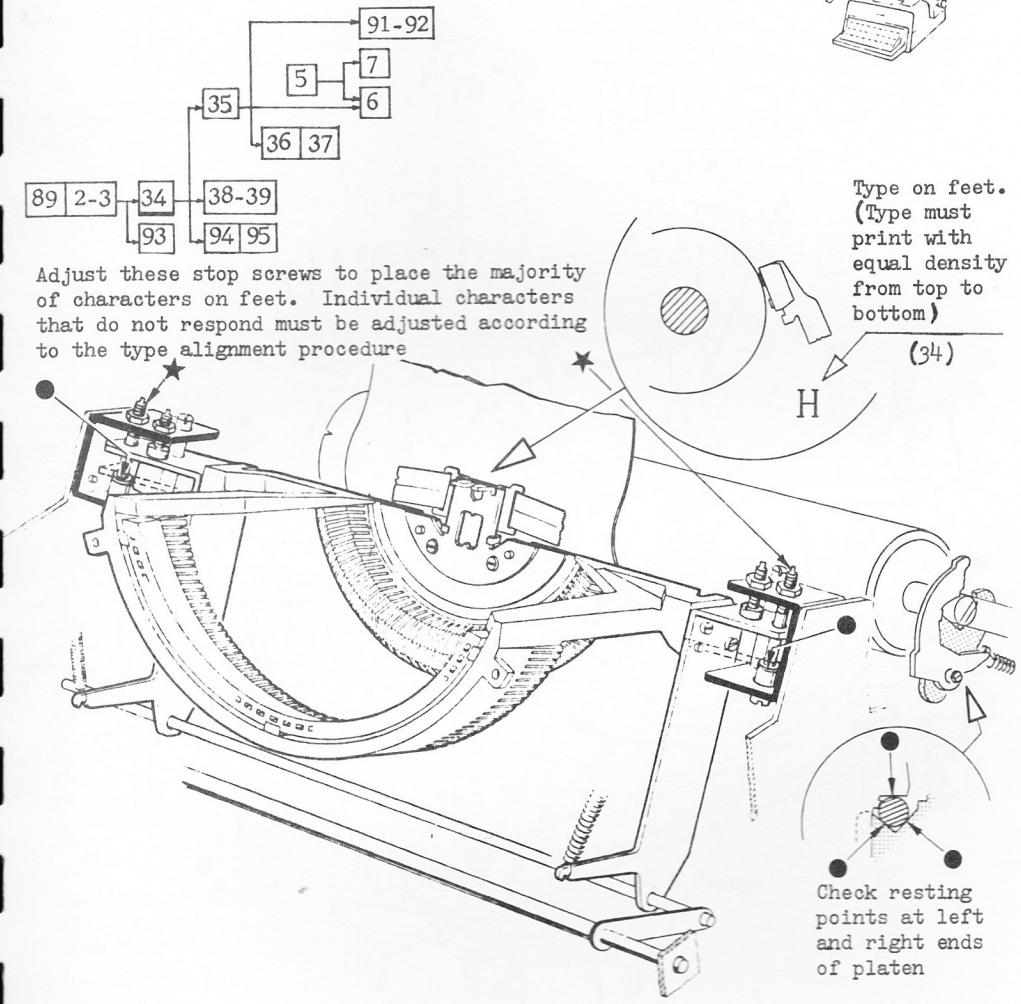


33



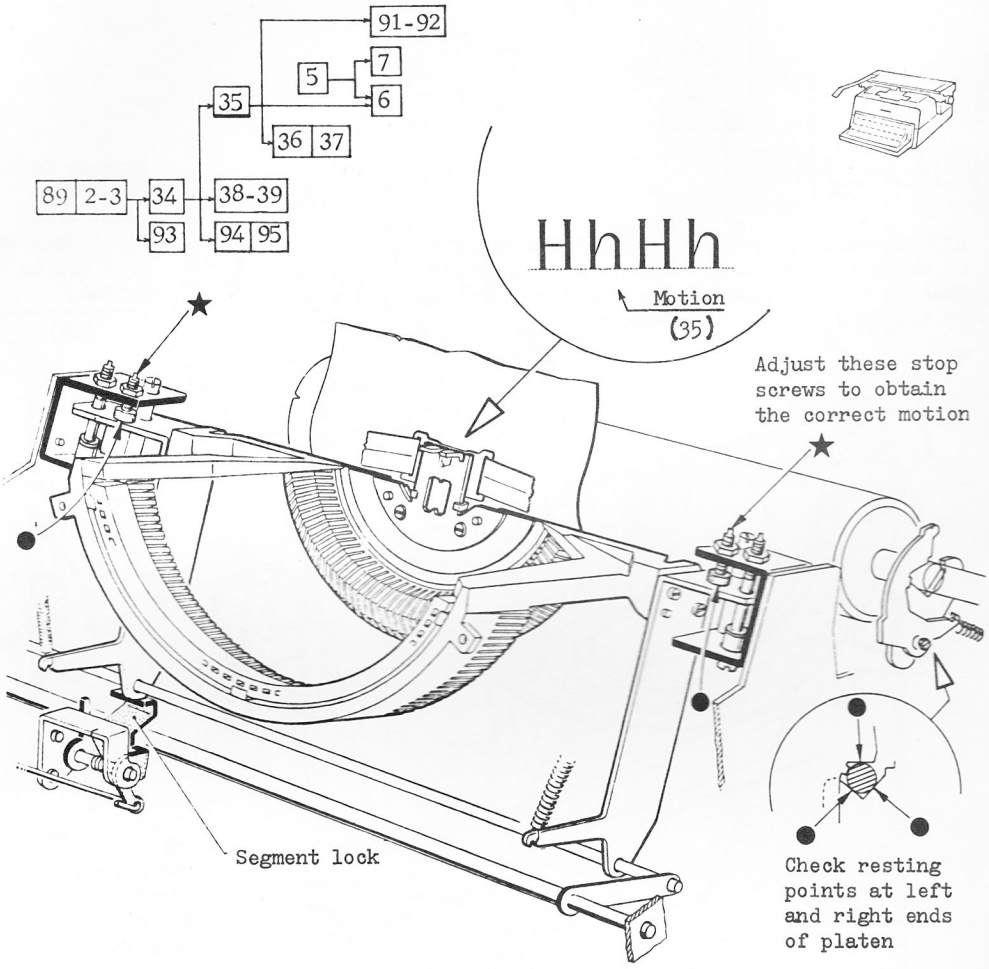
- To check freedom of movement of segment, depress and slowly release shift keys.

TYPE ON FEET



- Segment in upper case.
- Check if type is on feet as described in Shift Test of FFG.

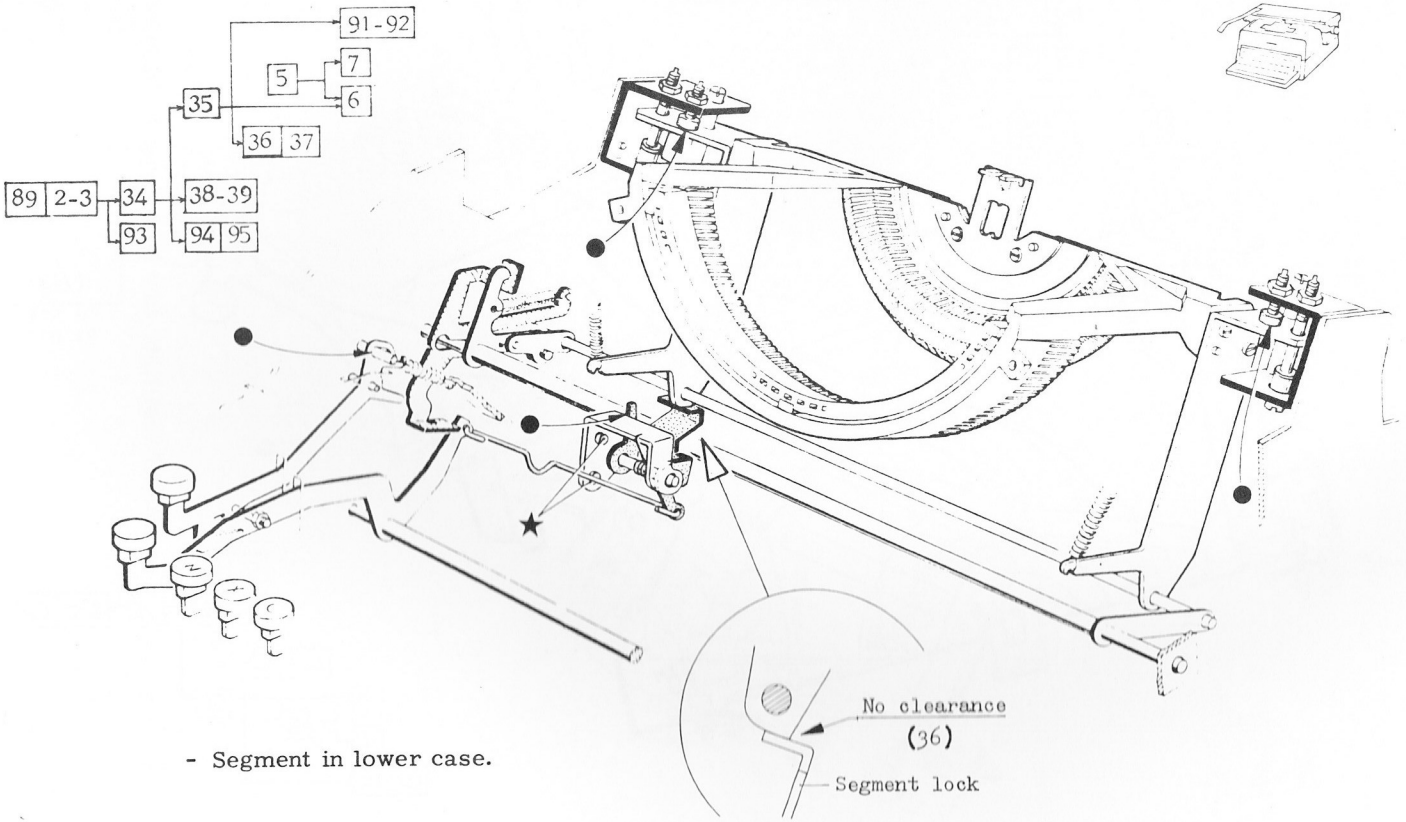
MOTION Hh (ALIGNMENT OF UPPER-CASE CHARACTERS TO LOWER-CASE CHARACTERS)



- Check motion as described in Shift Test of FFG.

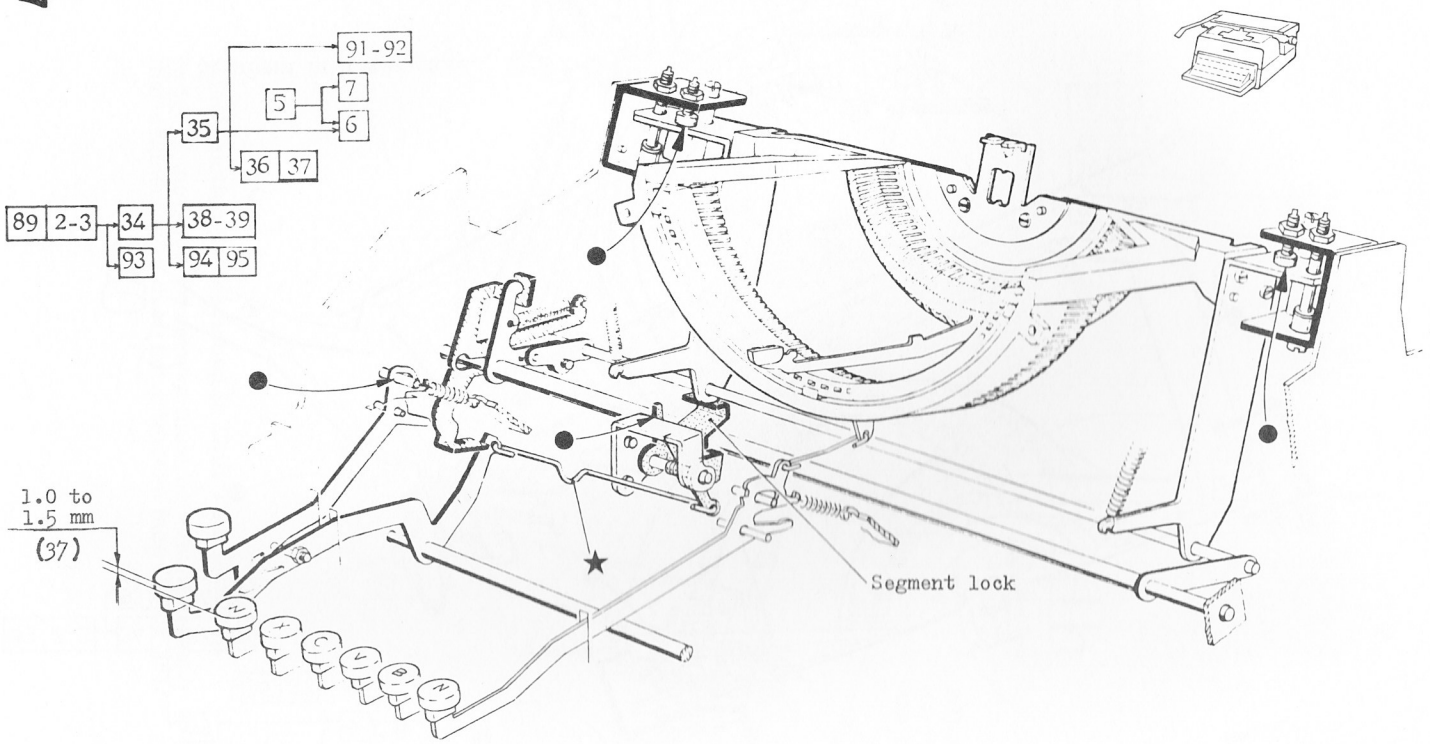
  Note: If motion stop screws must be adjusted, make certain that segment lock does not interfere (see Check 36).

LOCKING OF SEGMENT (IN LOWER CASE)



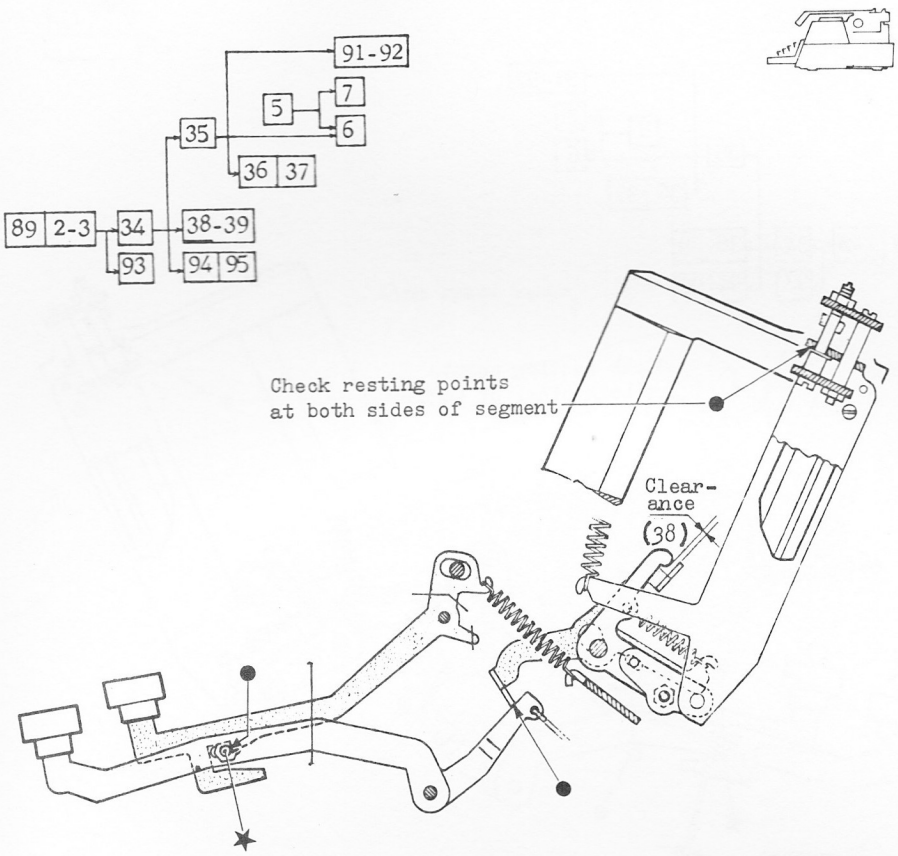
- Segment in lower case.

SEGMENT LOWER CASE LOCK RELEASE



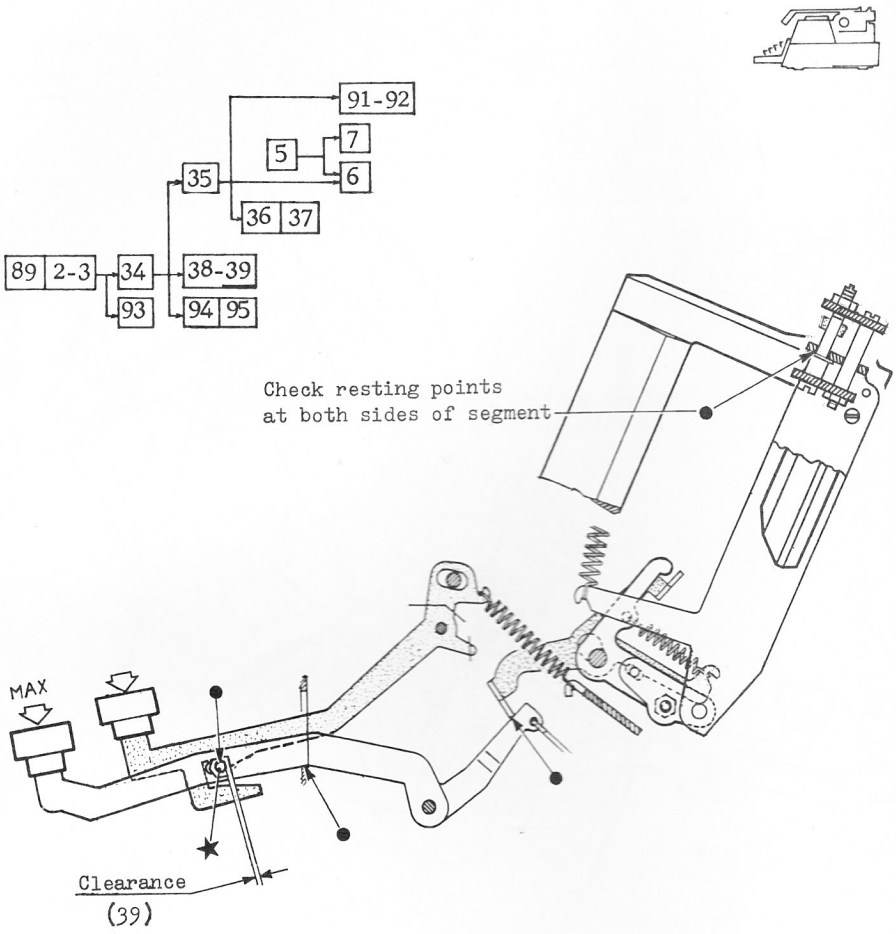
- Segment in lower case.

YIELDING OF SHIFT JOINT



- Segment in upper case with shift lock key engaged.

SHIFT LOCK

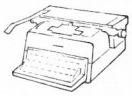


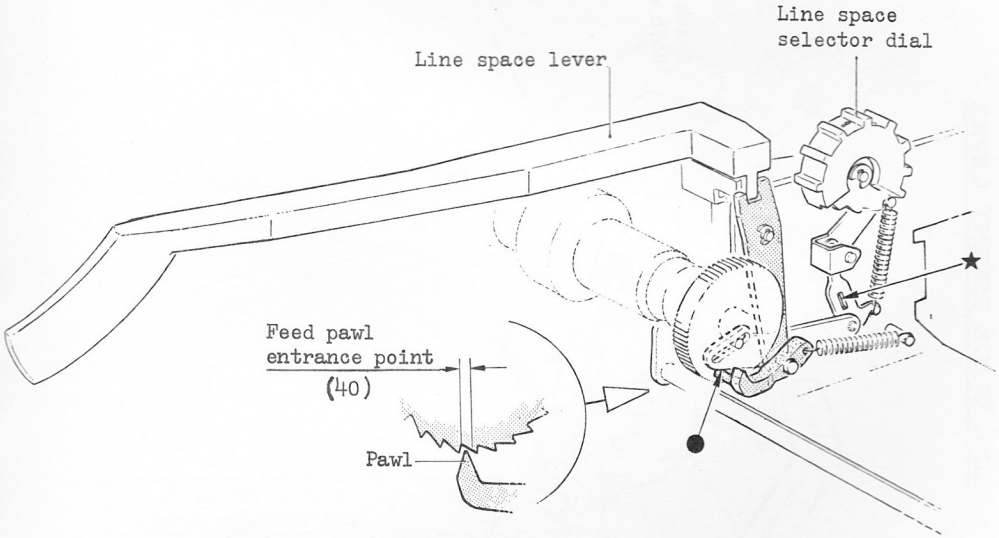
- To check, depress shift lock key.

  Note: Shift lock key must release with a light depression of either shift key.

ENGAGEMENT OF LINE SPACE FEED PAWL

41 -43	40 - 42

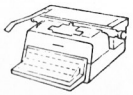


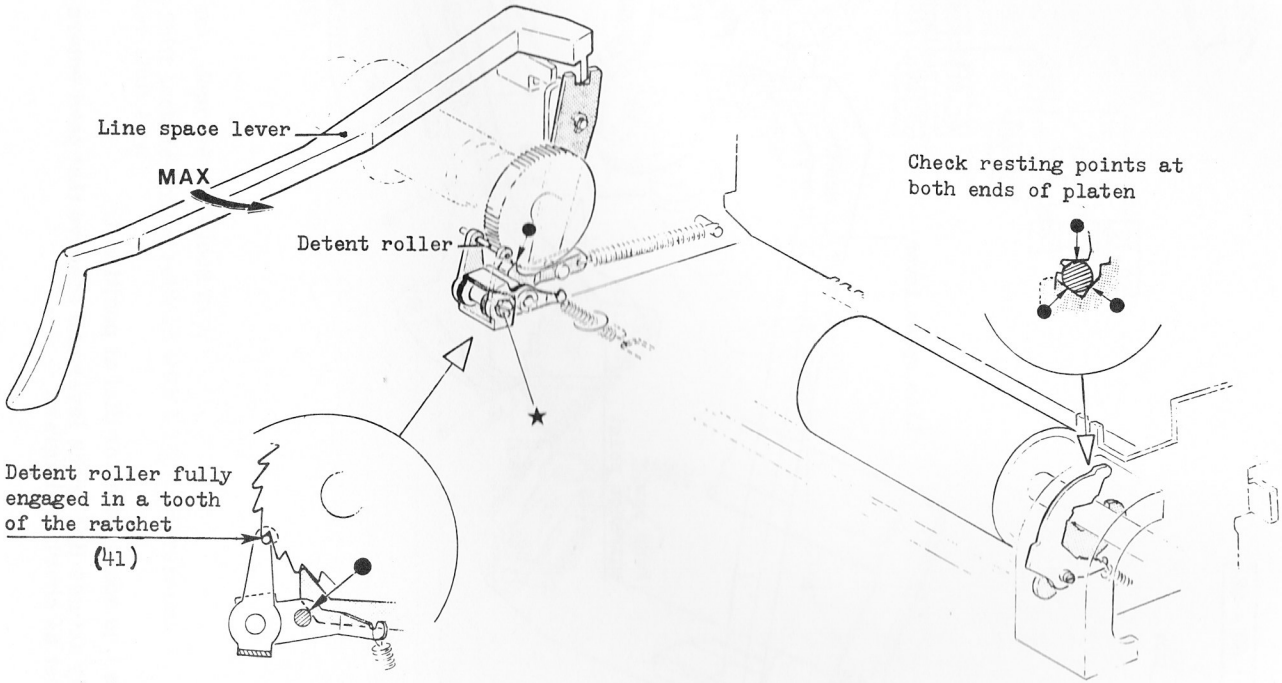


- Place line space selector dial at position 1.
- Slowly actuate line space lever and observe that pawl enters ratchet as shown in diagram.

LINE SPACE DETENT LEVER

41 - 43	40 - 42

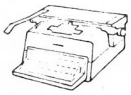


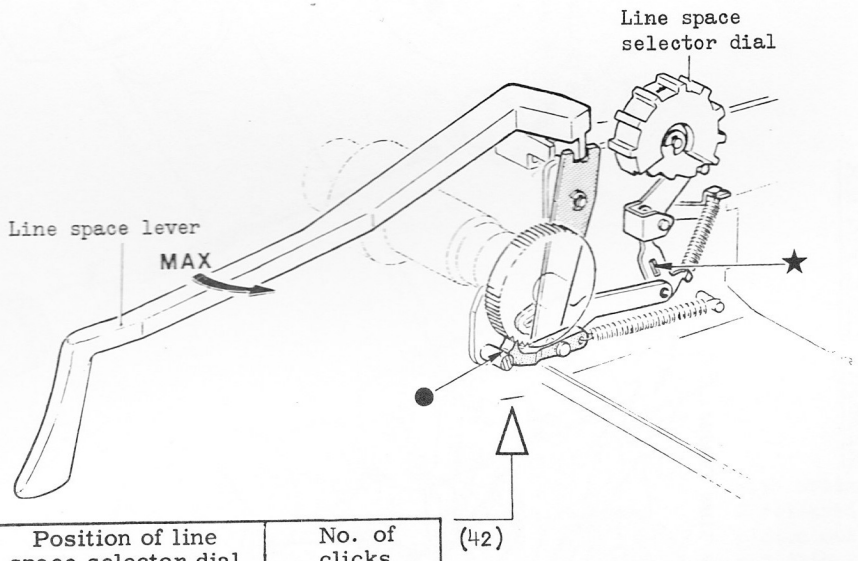


- Line space lever fully rotated.

LINE SPACE RATCHET FEED QUANTITY

41 - 43 | 40 - 42



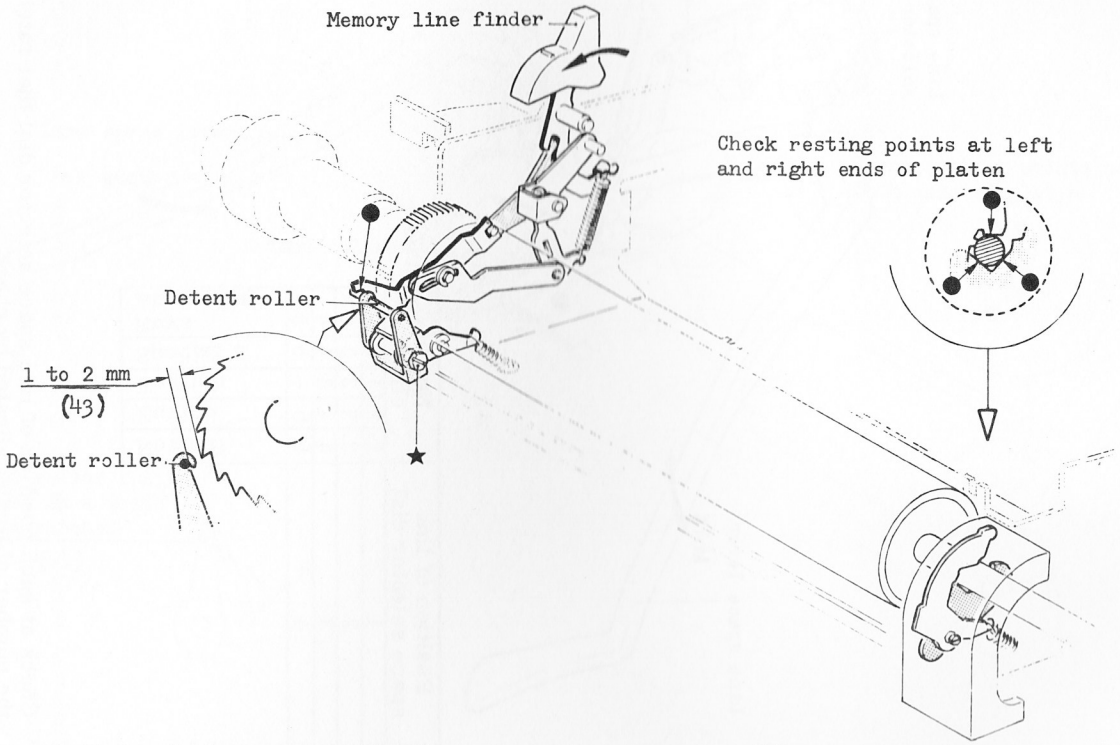


Position of line space selector dial	No. of clicks				
1	2	2	1	2	2
2	3	3	2	3	3
3	4	4	3	4	4
4	5	5	-	5	5
	Normal	Zurich	English	Special 2	Ruys Amer-Ruys

- Check at each position of line space selector dial that ratchet advances the number of teeth indicated by chart.

MEMORY LINE FINDER

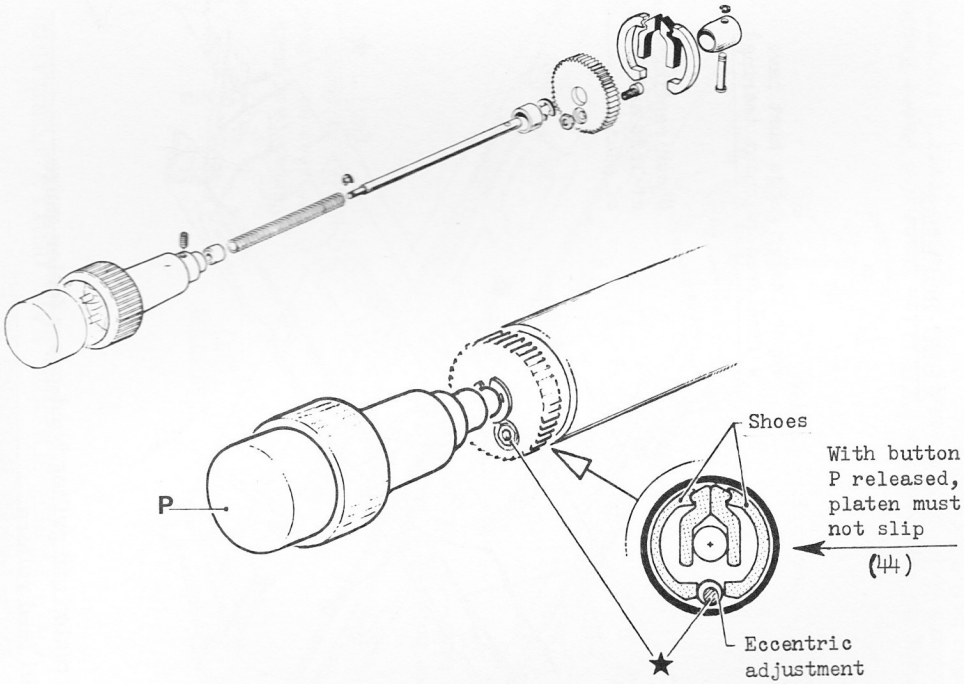
41 - 43 | 40 - 42



- Check by placing memory line finder lever in released position.

PLATEN VARIABLE

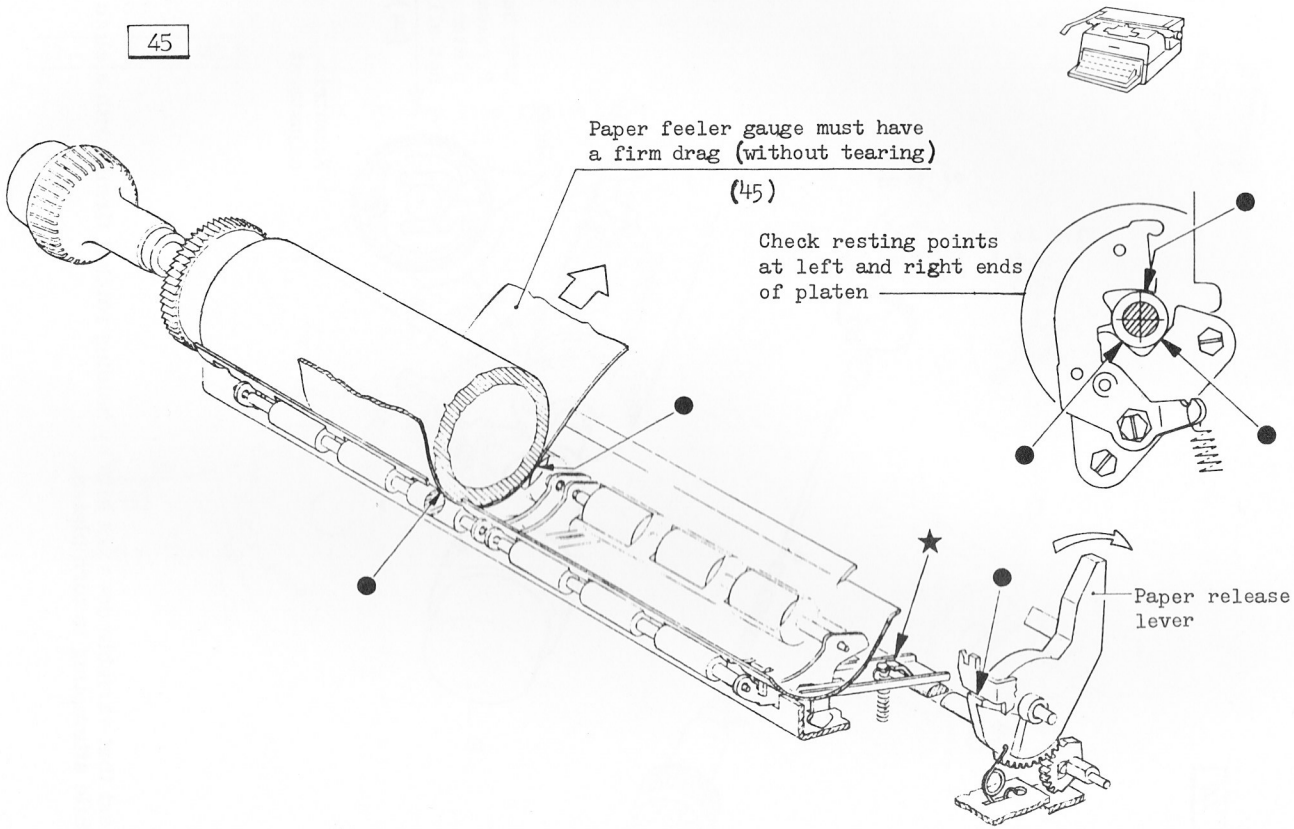
44



- Test that variable does not slip by holding ratchet firmly with a cloth while attempting to turn platen.

FEED ROLLERS

45



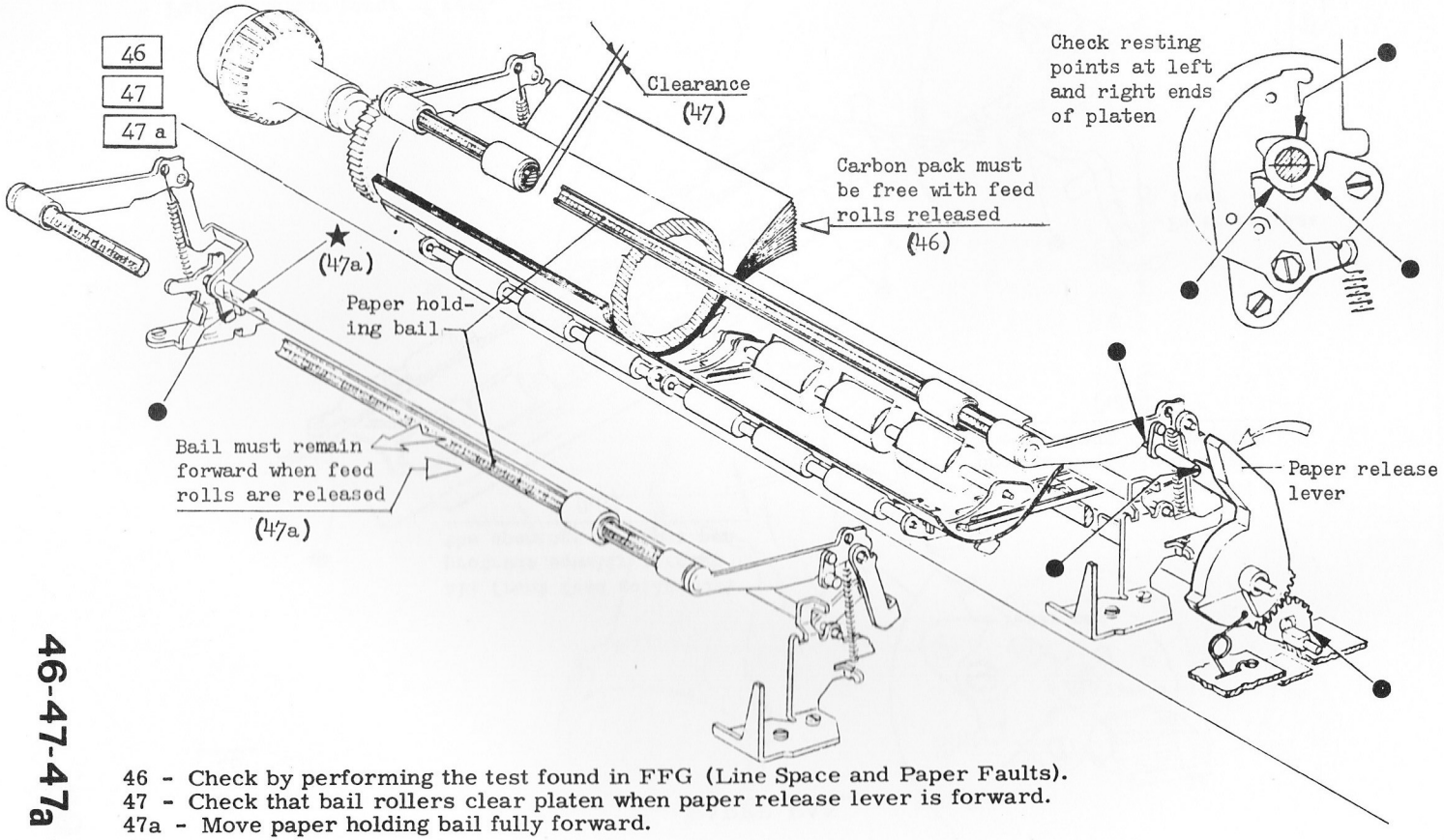
- Perform check by holding platen and pulling bond-paper feeler gauge.

  Note: Perform check on all feed rollers.

46 - PAPER RELEASE

47 - PAPER HOLDING BAIL

47a - PAPER HOLDING BAIL (FULLY FORWARD)

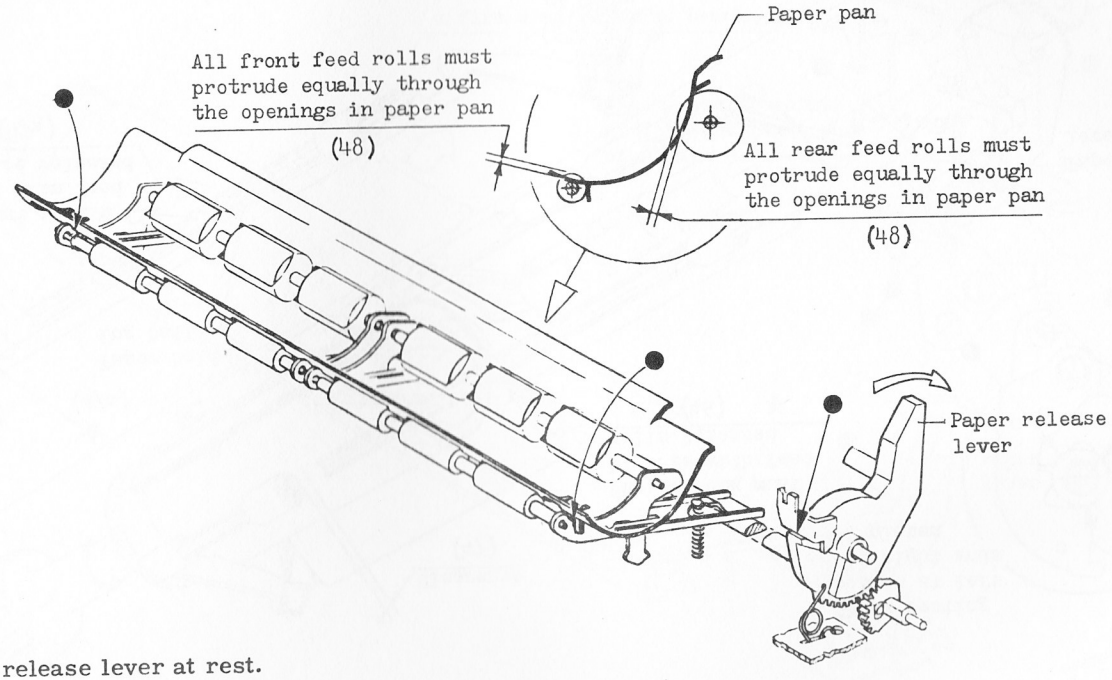


46 - Check by performing the test found in FFG (Line Space and Paper Faults).
47 - Check that bail rollers clear platen when paper release lever is forward.
47a - Move paper holding bail fully forward.

46-47-47a

PAPER PAN

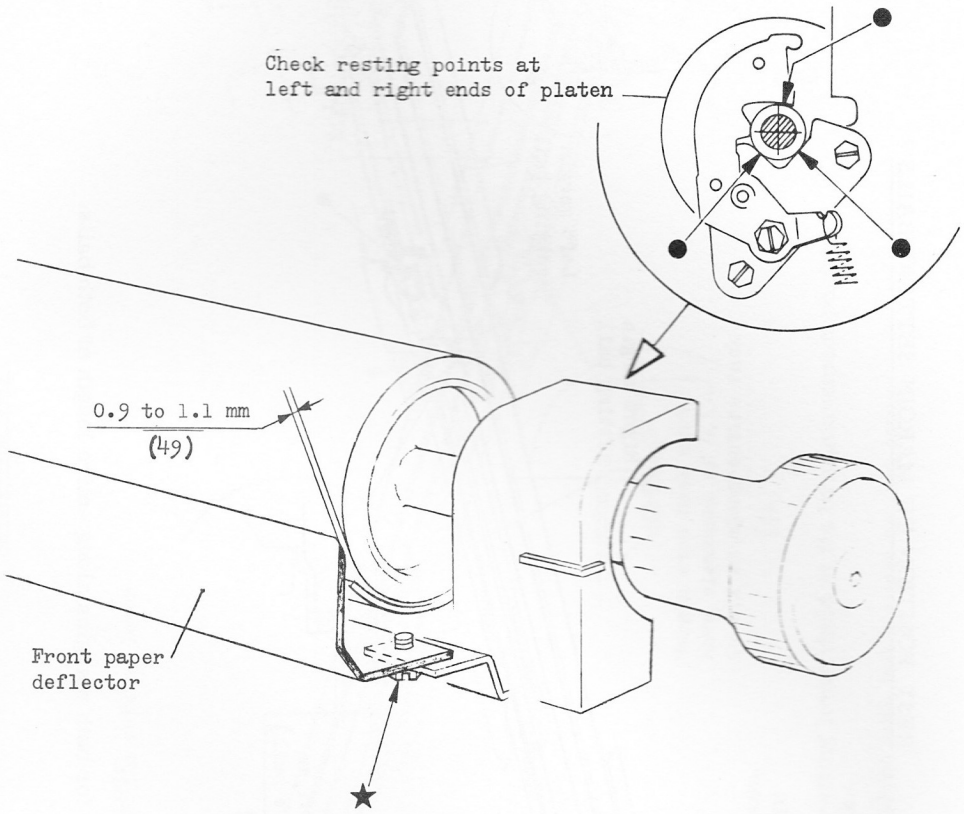
48


Paper pan
All front feed rolls must protrude equally through the openings in paper pan
(48)
All rear feed rolls must protrude equally through the openings in paper pan
(48)
Paper release lever

- Paper release lever at rest.

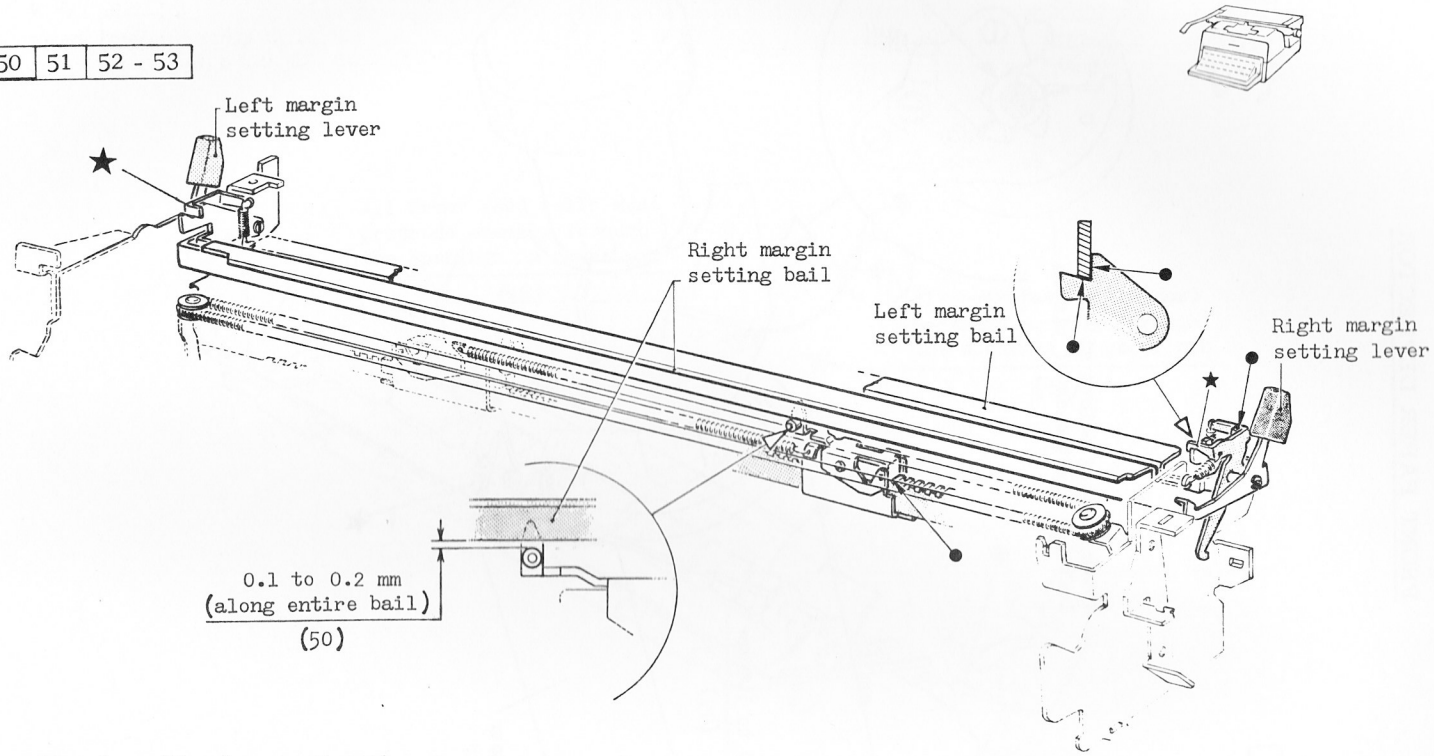
FRONT PAPER DEFLECTOR

49



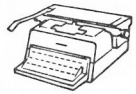
REST POSITION OF MARGIN SETTING BAILS

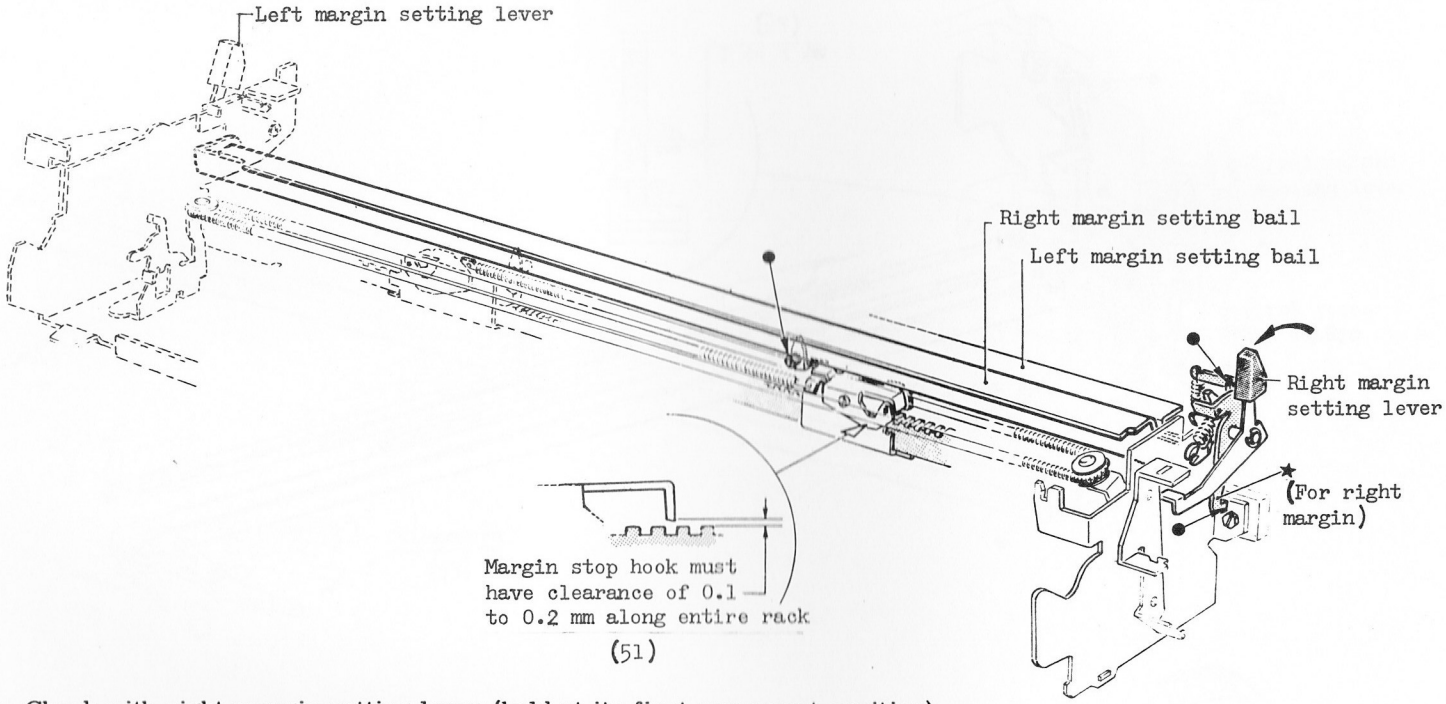
50 | 51 | 52 - 53



- Margin setting levers at rest.
- Check condition required for both margins along entire length of both bails.

50	51	52 - 53



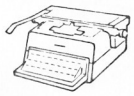

Left margin setting lever
Right margin setting bail
Left margin setting bail
Right margin setting lever
(For right margin)
Margin stop hook must have clearance of 0.1 to 0.2 mm along entire rack
(51)

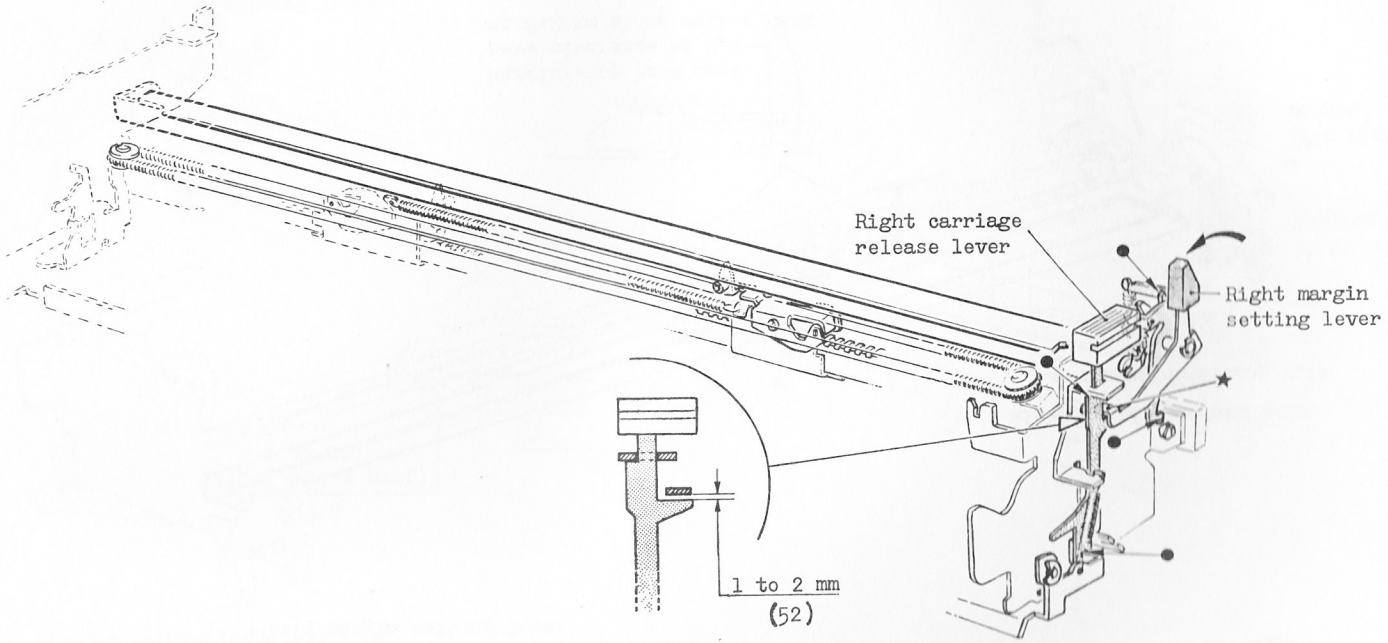
- Check with right margin setting lever (held at its first movement position) along entire length of rack.

Note: Repeat above procedure with left margin setting lever.

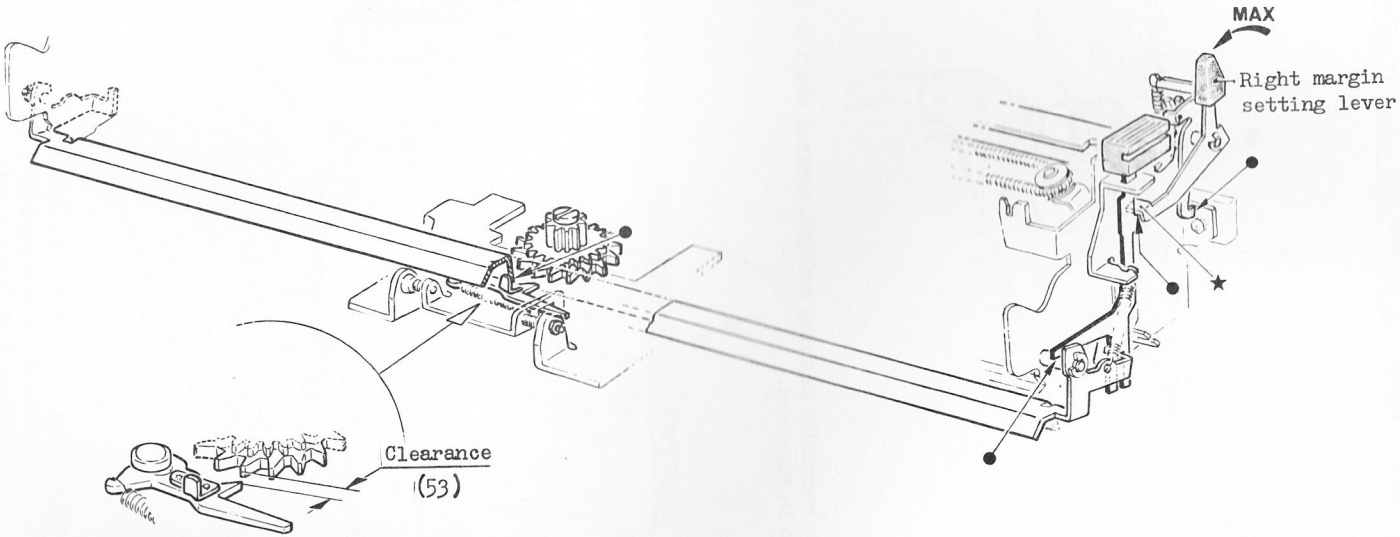
POSITION OF MARGIN SETTING LEVERS IN THEIR FIRST MOVEMENT POSITION (RELATIVE TO CARRIAGE RELEASE LEVERS)

50 | 51 | 52 - 53



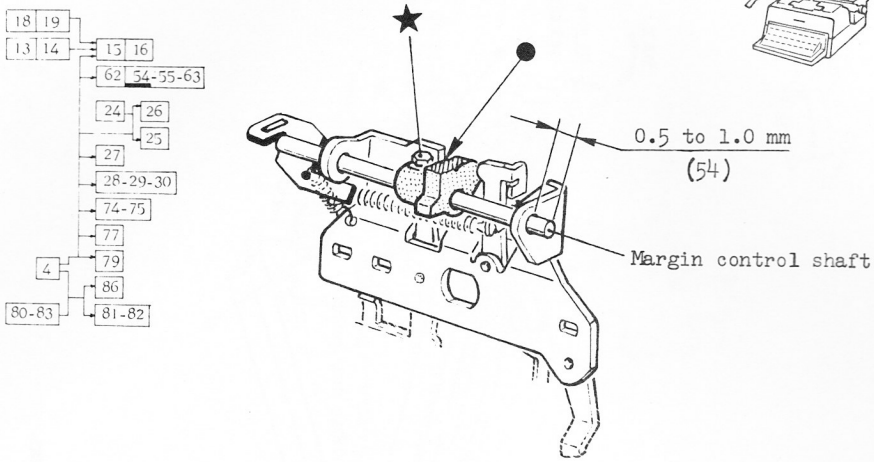


- Check with right margin setting lever in its first movement position.
- Perform same check with left margin setting lever.



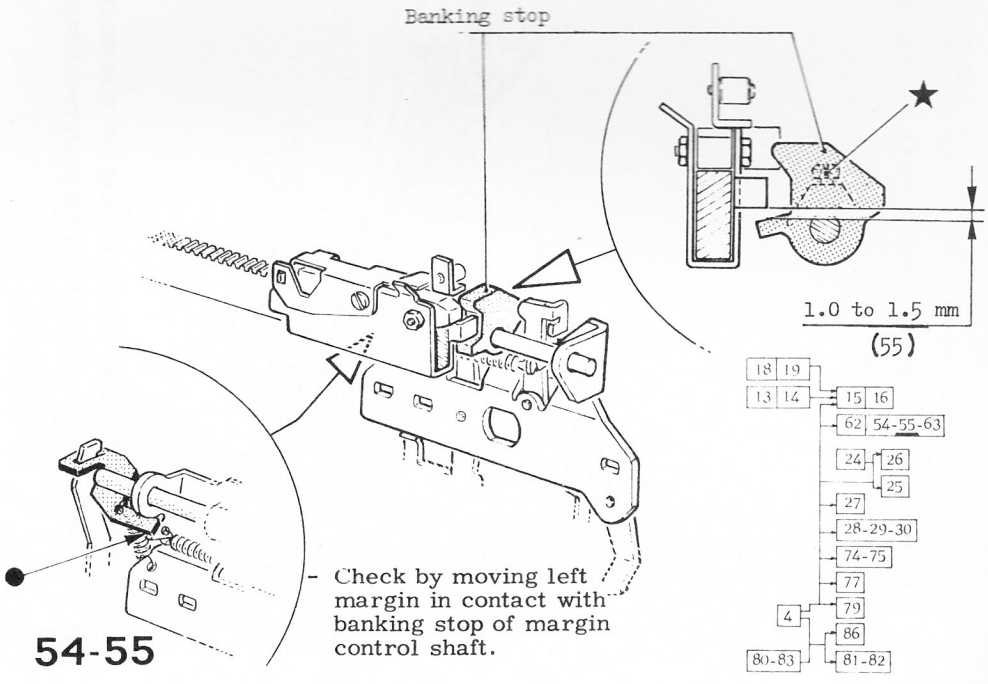
- Check with right margin setting lever in its full movement position.
- Perform same check with left margin setting lever.

LATERAL MOVEMENT OF MARGIN CONTROL SHAFT



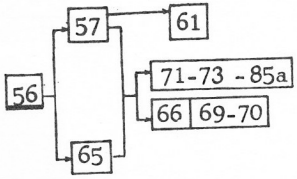
- Check by manually pushing margin control shaft to its limiting position as shown in diagram.

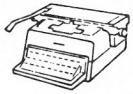
ANGULAR REST POSITION OF BANKING STOP

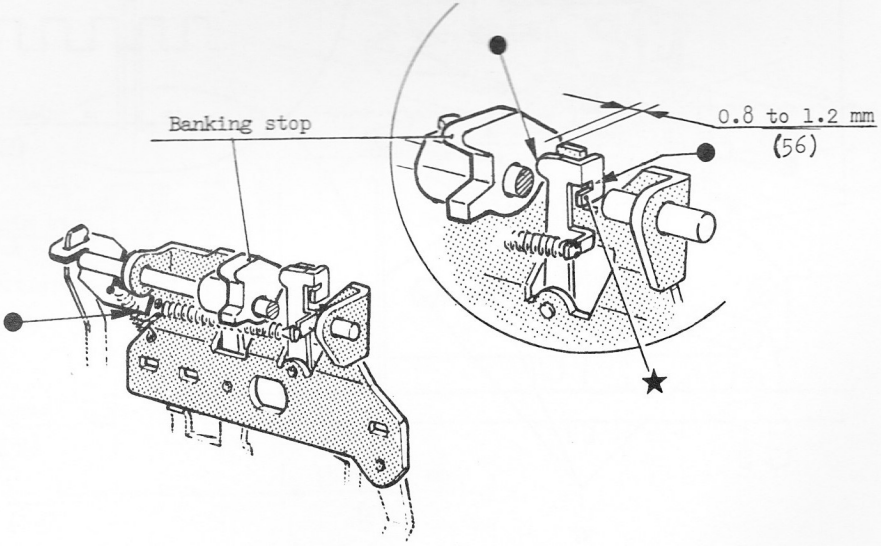


- Check by moving left margin in contact with banking stop of margin control shaft.

LATERAL REST POSITION OF BANKING STOP



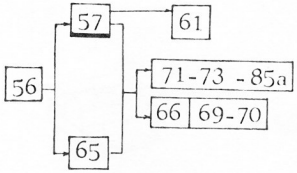


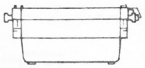


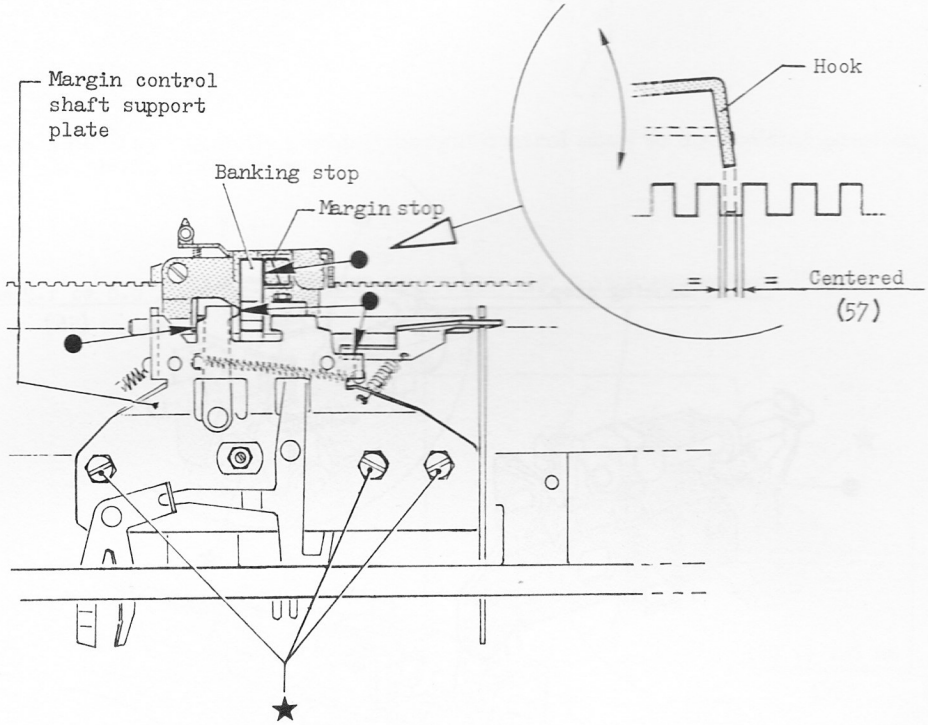
- When performing this check, be certain that margin stops are not in contact with banking stop.

BANKING ADJUSTMENT

(Entrance of left margin stop hook into margin rack)



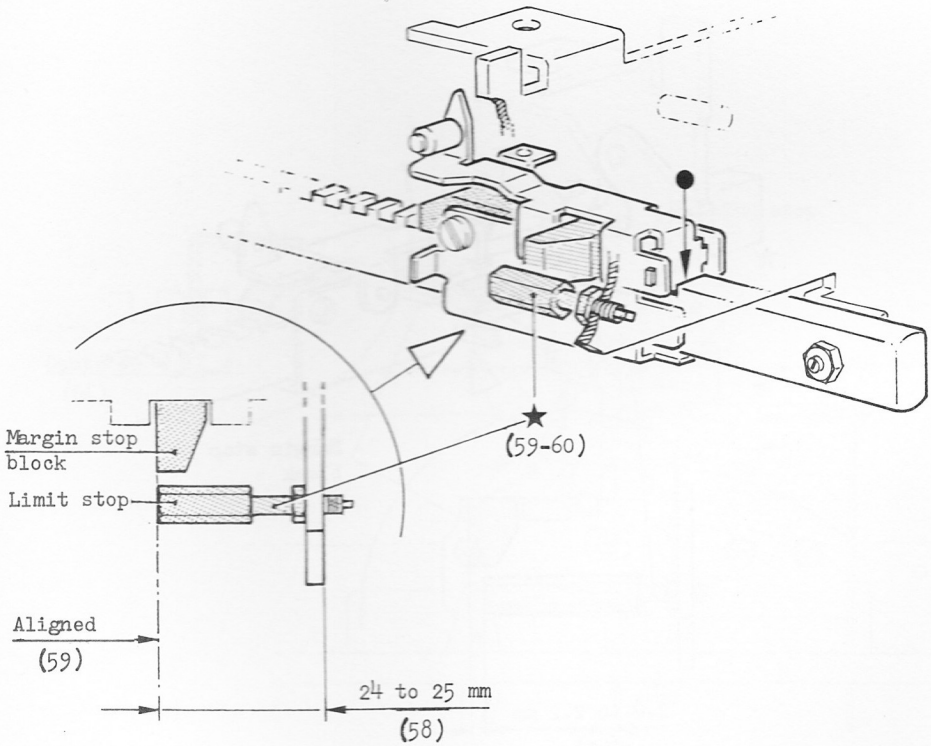




- To check: Return carriage to banked position. Rotate left margin setting lever to its first movement position. Observe that left margin stop hook enters centrally between two teeth of margin rack as setting lever is released.

POSITION OF LEFT LIMIT STOP

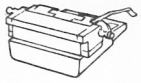
58 - 59

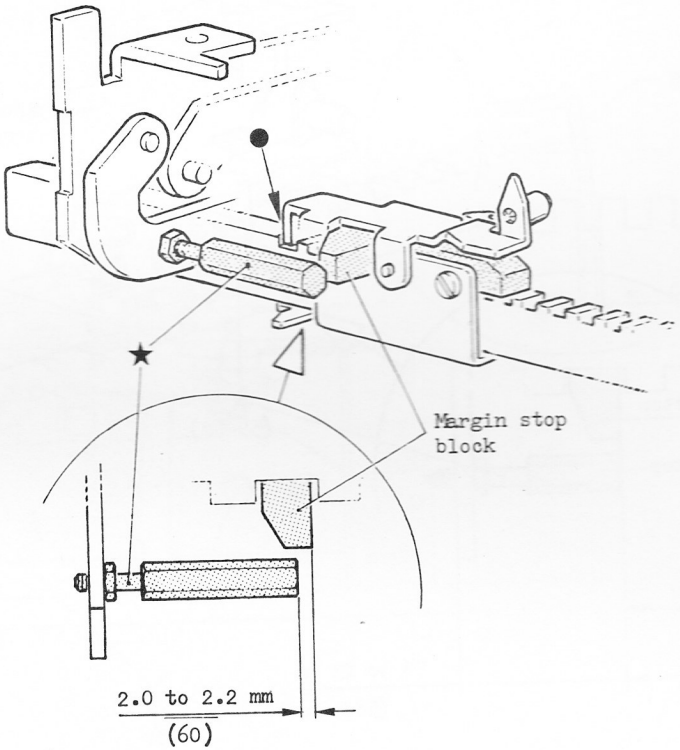


Note: To check condition shown in diagram, insert hook of left margin stop in first usable notch of margin rack. With margin stop in this position, align limit stop as illustrated.

POSITION OF RIGHT LIMIT STOP

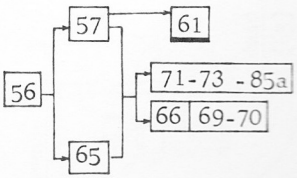
60

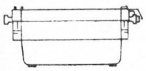


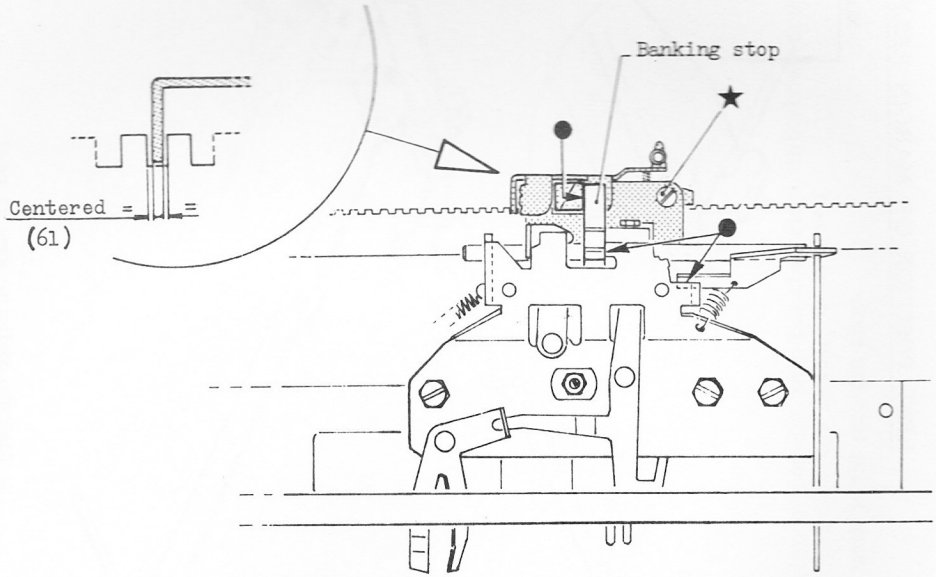


- Position hook of right margin stop into last notch of margin rack. With margin stop in this position, align right limit stop as shown in illustration.

ENTRANCE OF RIGHT MARGIN STOP HOOK INTO RACK

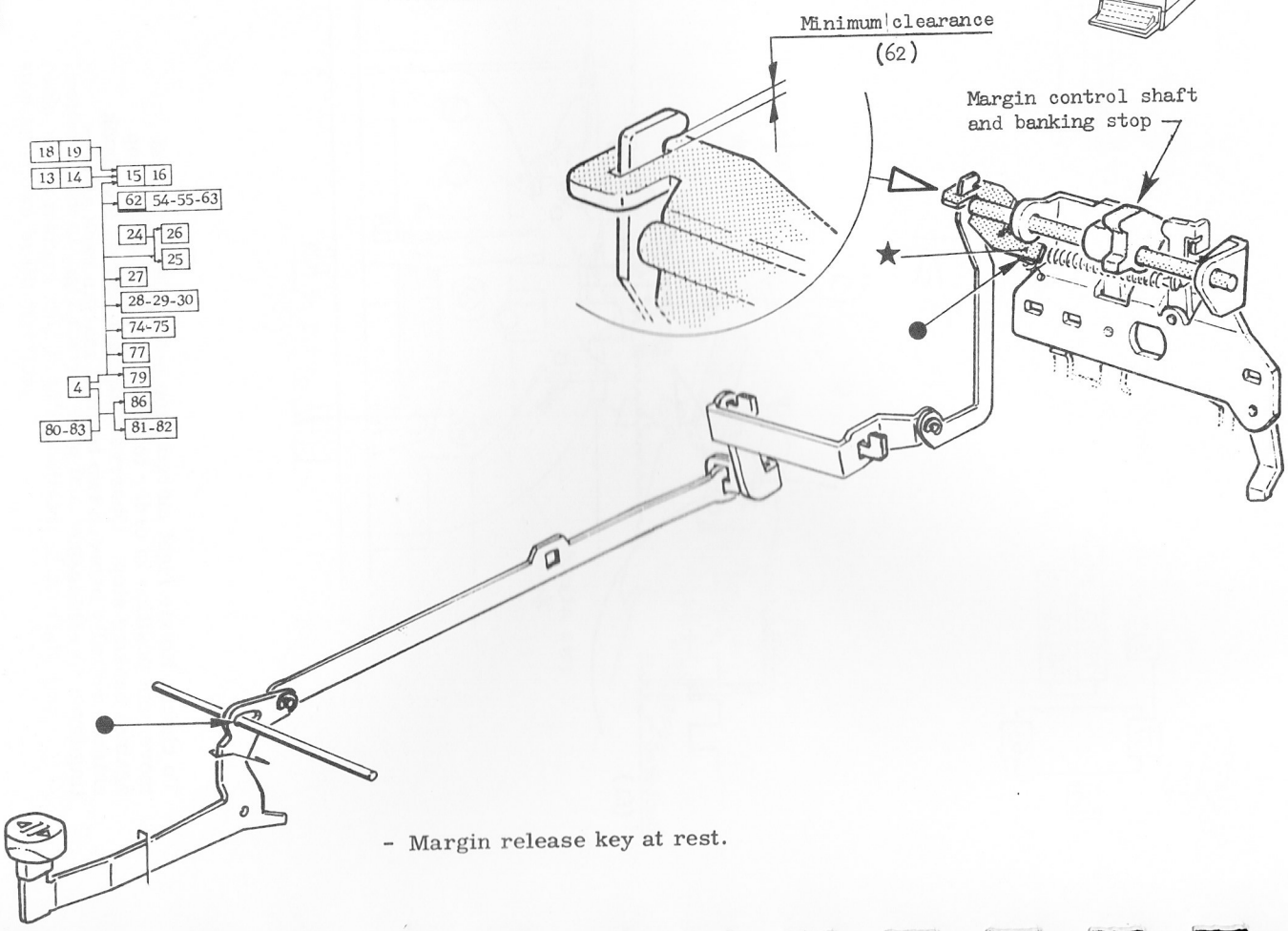






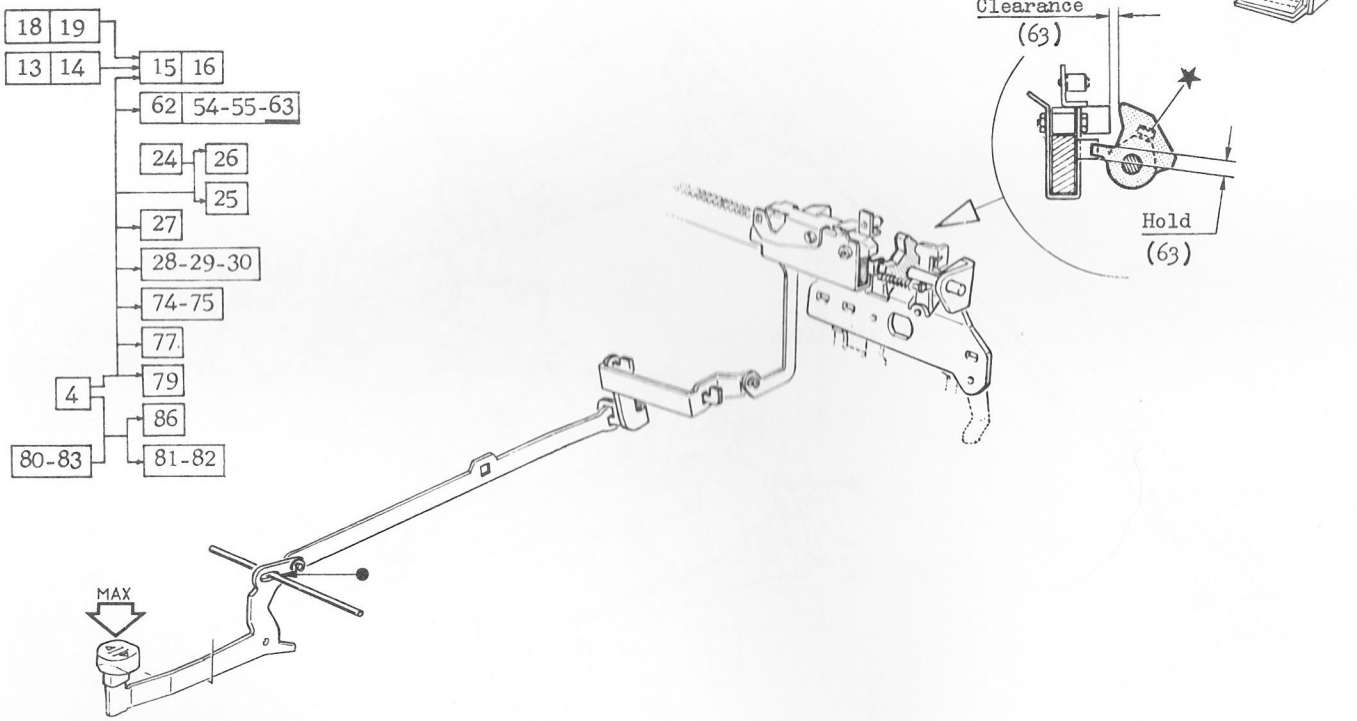
- To check: Rotate right margin stop setting lever to first movement position in order to position right margin stop against banking stop. Observe that right margin stop hook enters centrally between two teeth of margin rack as setting lever is released.

REST POSITION OF MARGIN RELEASE KEY



- Margin release key at rest.

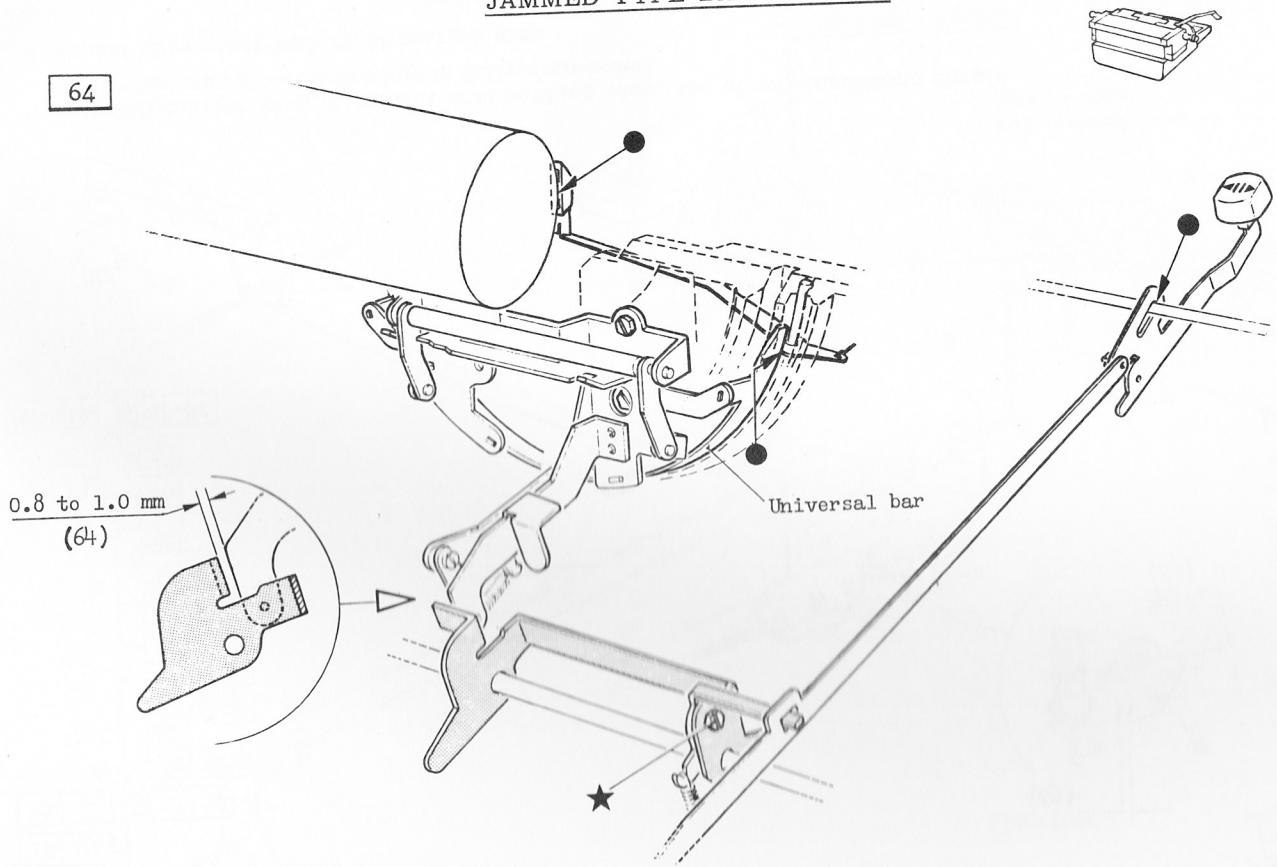
MARGIN RELEASE AND PARAGRAPH INDENTATION



- With left margin stop in contact with banking stop, the above conditions should exist when margin release key is fully depressed.
- Repeat above test with right margin stop.

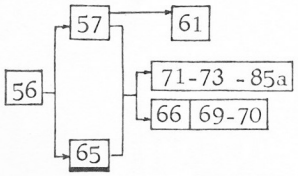
JAMMED TYPE BAR RELEASE

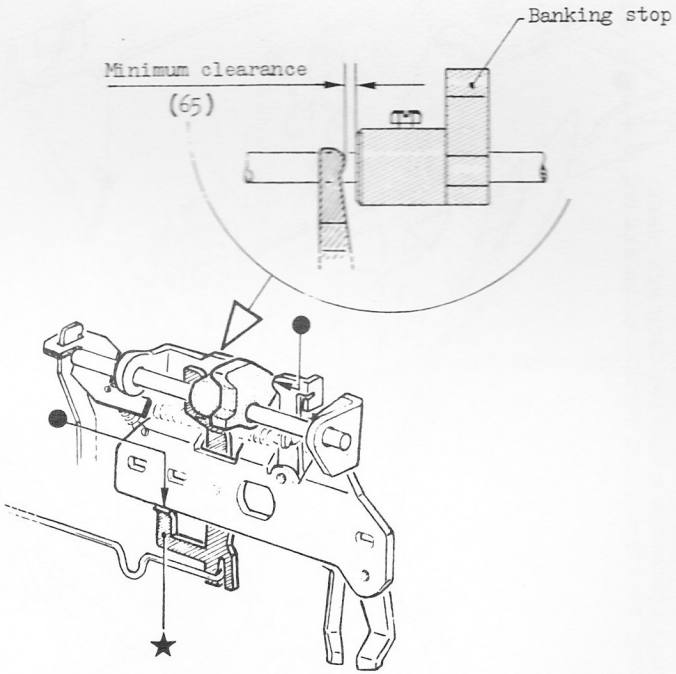
64



- Check clearance shown with margin release key at rest and individually raise a center and end type bar to printing point.

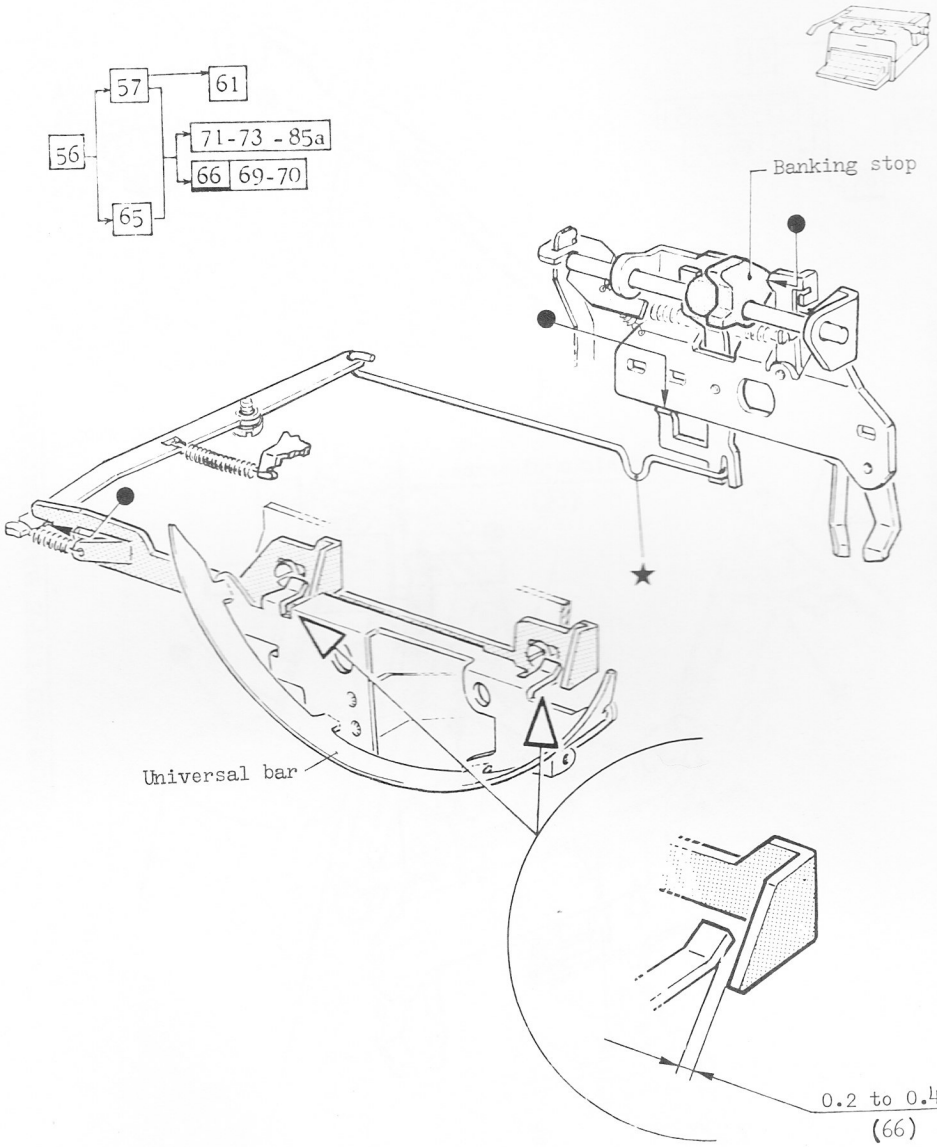
REST POSITION OF LINE LOCK MECHANISM





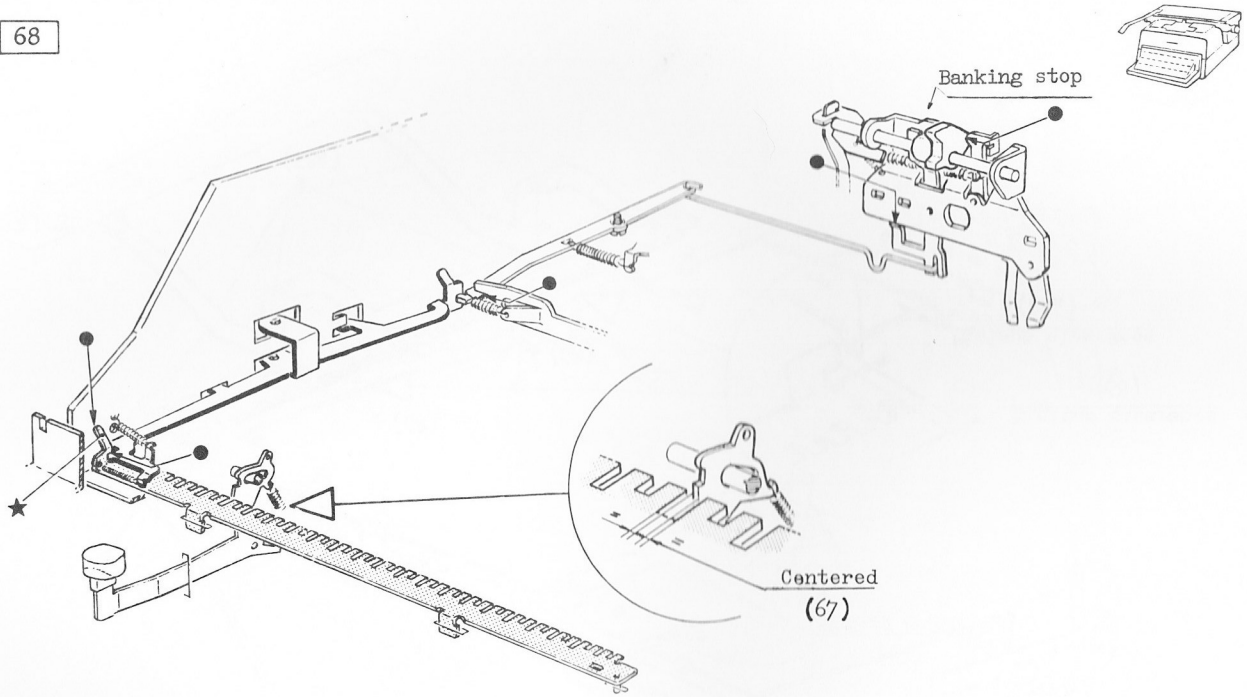
- To check: Be certain that margin stops are not in contact with banking stop.

UNIVERSAL BAR LOCKING MECHANISM AT REST



- When checking clearance, be sure that margin stops are not in contact with banking stop.

REST POSITION OF KEYBOARD LINE LOCK COMB

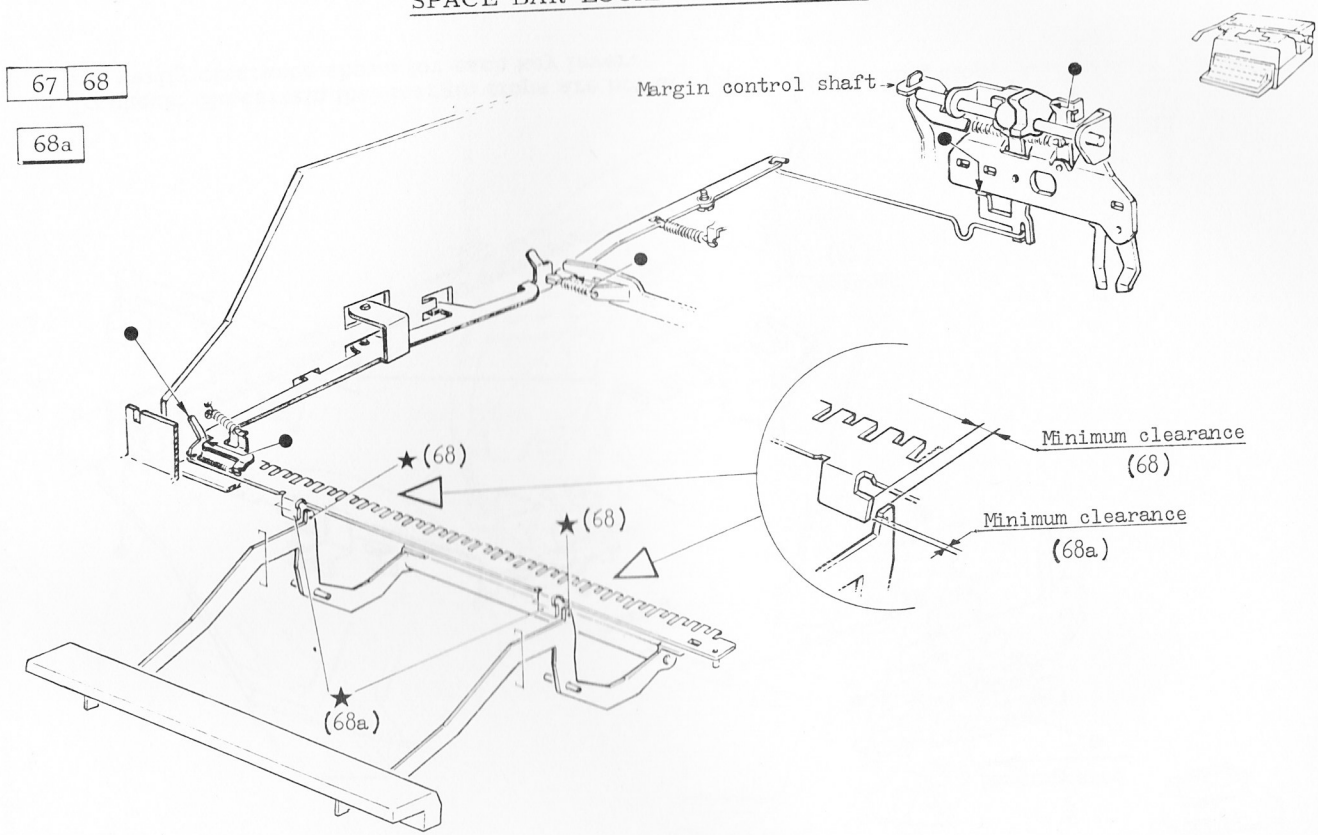


- To check: Be certain that margin stops are not in contact with banking stop, and verify clearance shown for each key lever.

SPACE BAR LOCKING MECHANISM

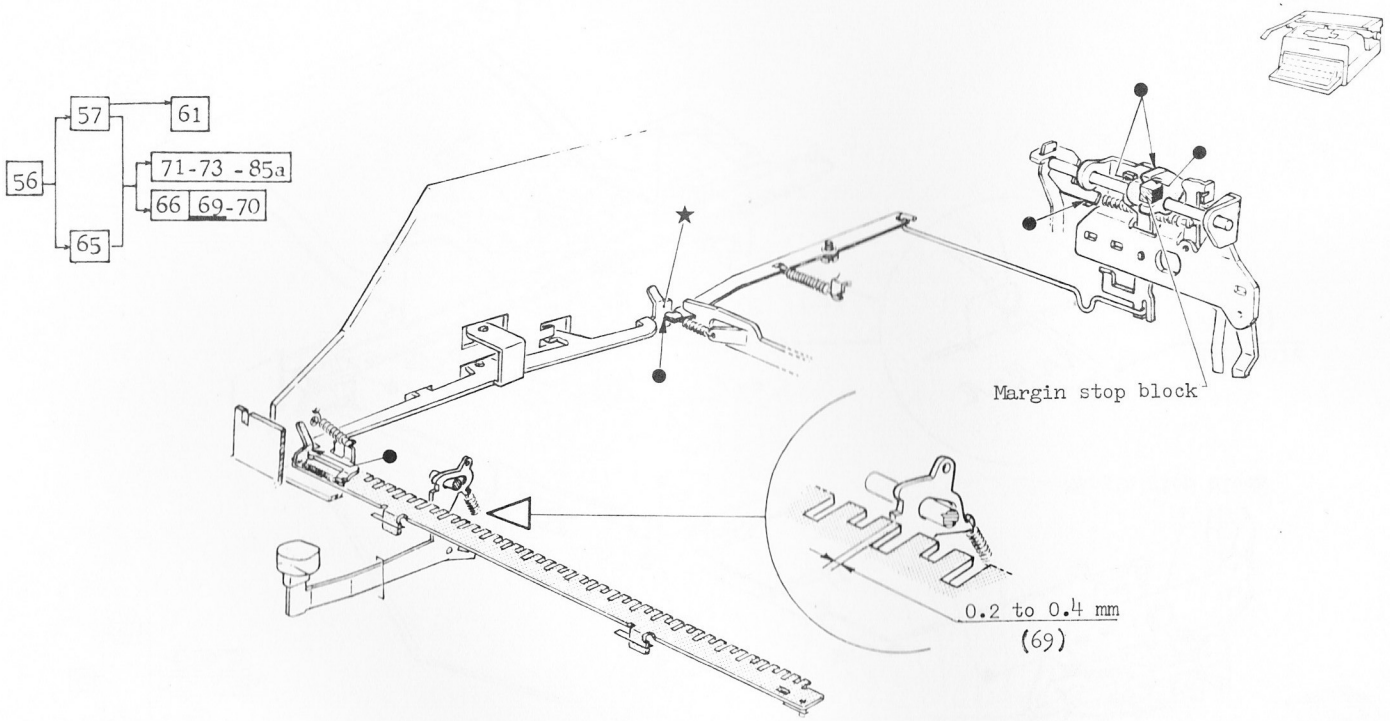
67 | 68

68a



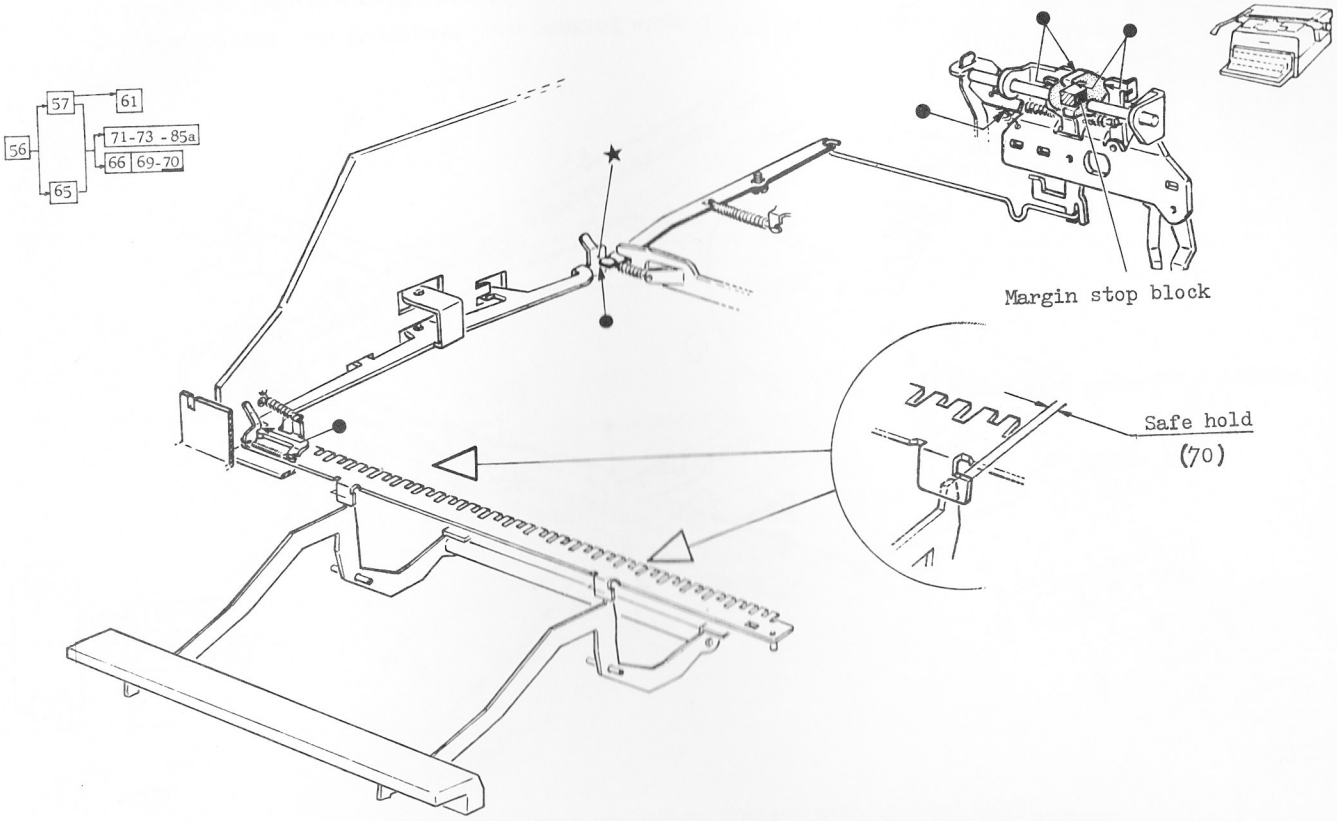
- To check: Be certain that margin stops are not in contact with banking stop; then depress space bar and verify clearance shown.

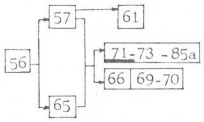
ACTIVATED POSITION OF KEYBOARD LINE LOCK COMB



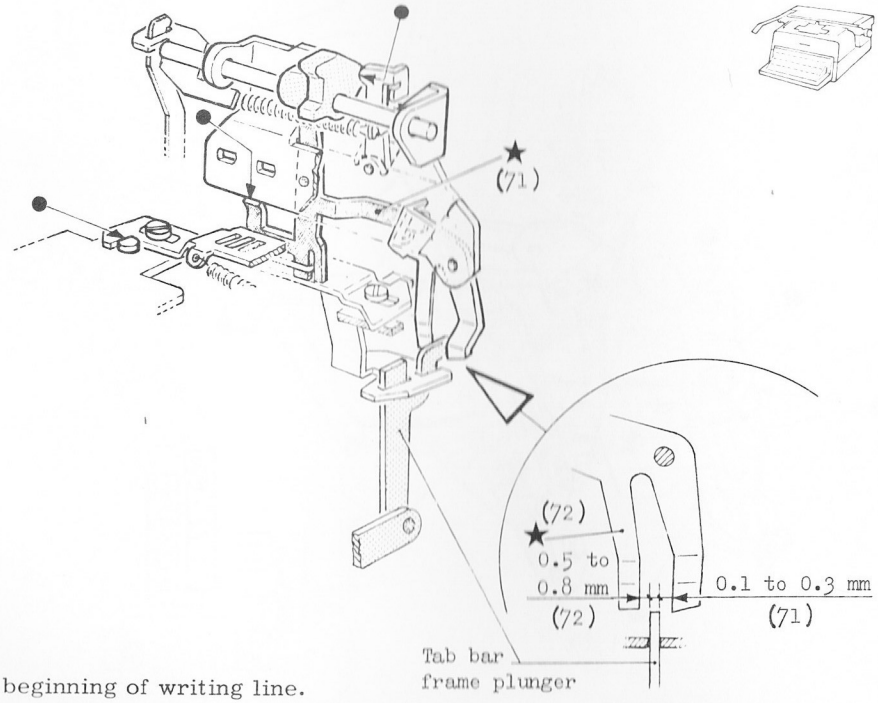
- Right margin stop in contact with banking stop.
- To check: Depress each character key lever for proper locking.

SPACE BAR LOCK (IN LINE LOCK POSITION)





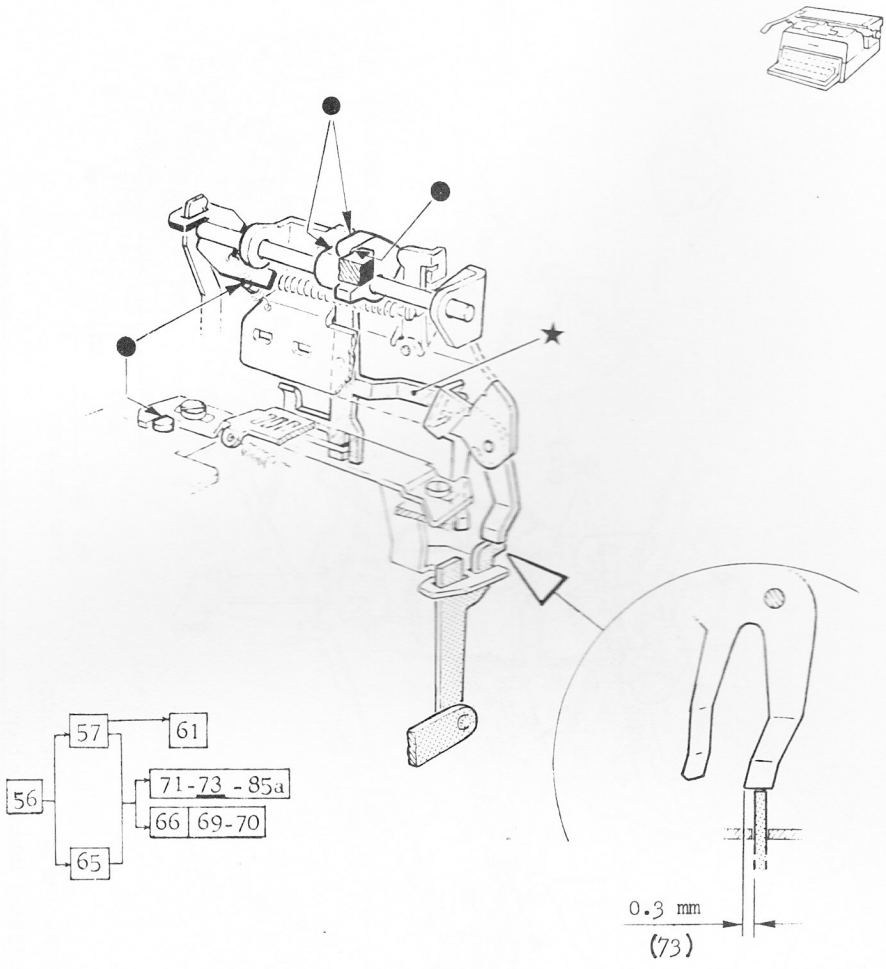
72



- Carriage at beginning of writing line.
- Check by depressing tabulator bar.

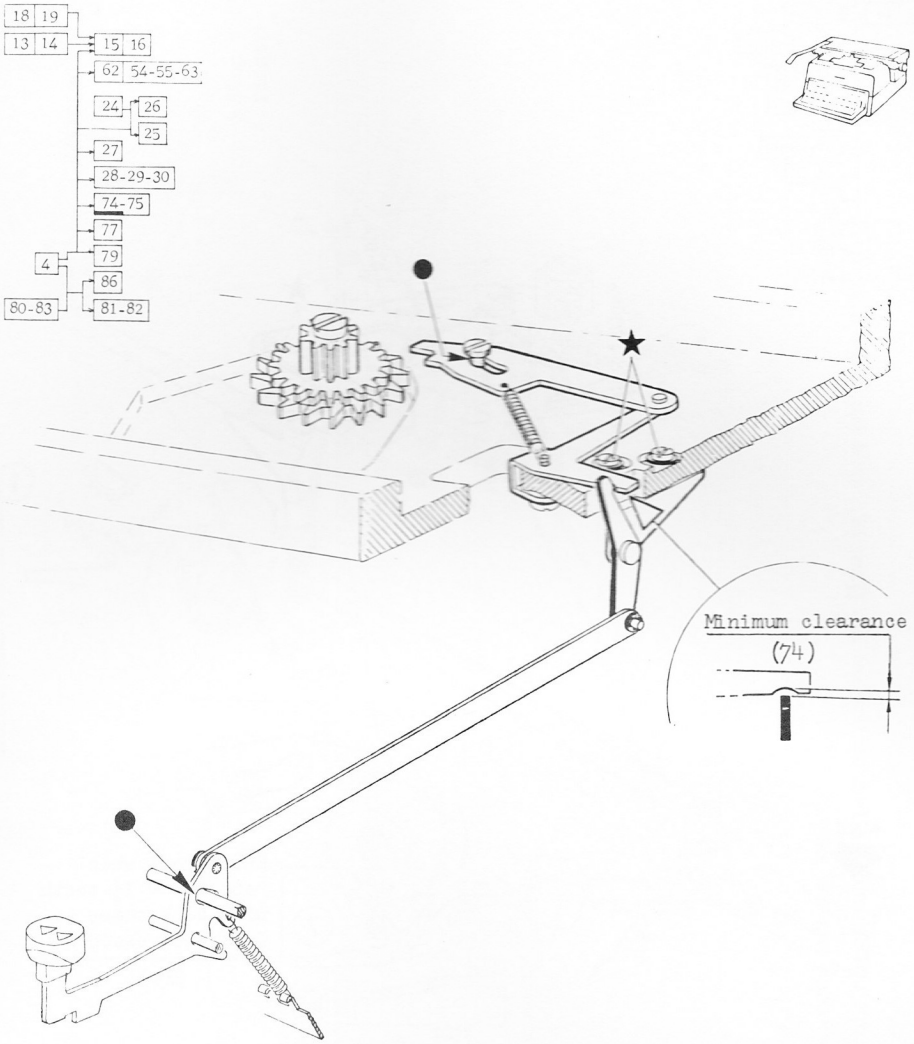
71-72

ACTUATED POSITION OF LINE LOCK MECHANISM FOR TABULATION



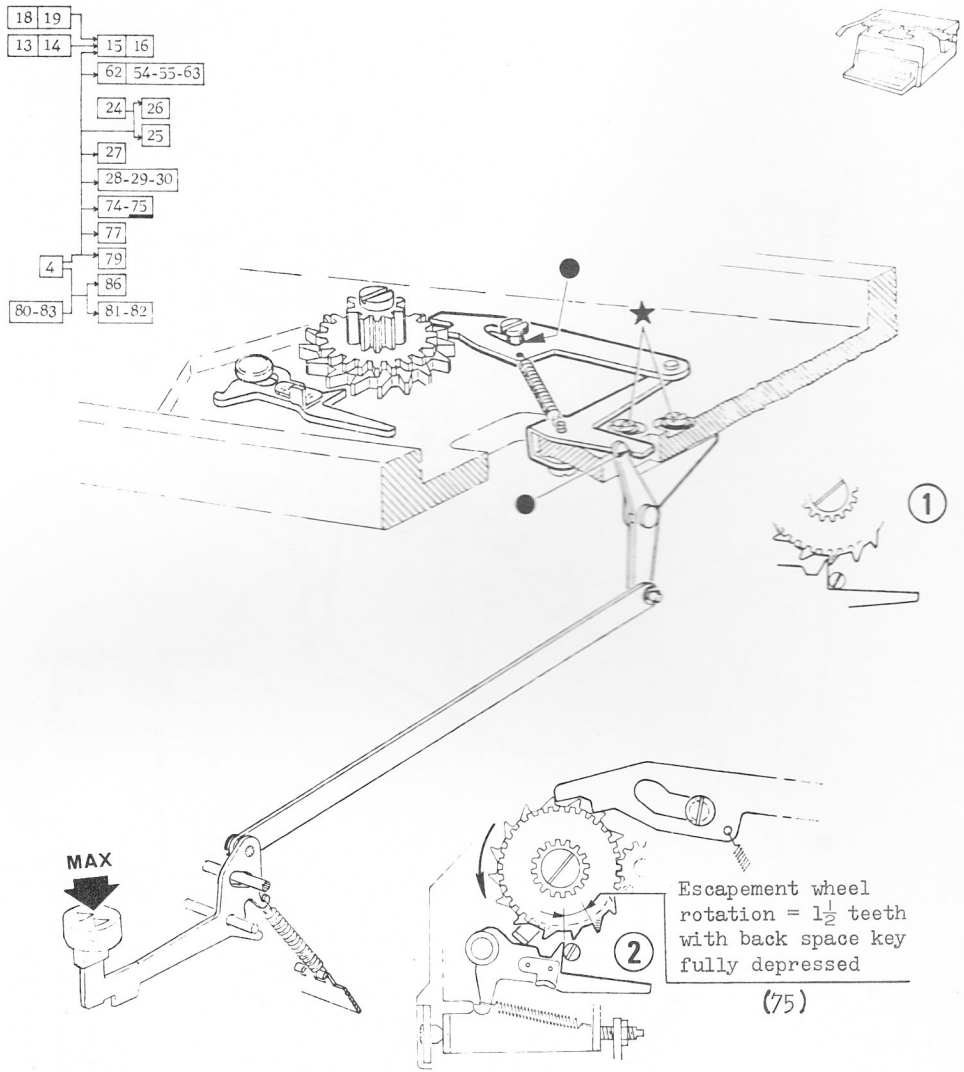
- Right margin in contact with banking stop.
- Check by attempting to depress tabulator bar.

REST POSITION OF BACK SPACE MECHANISM

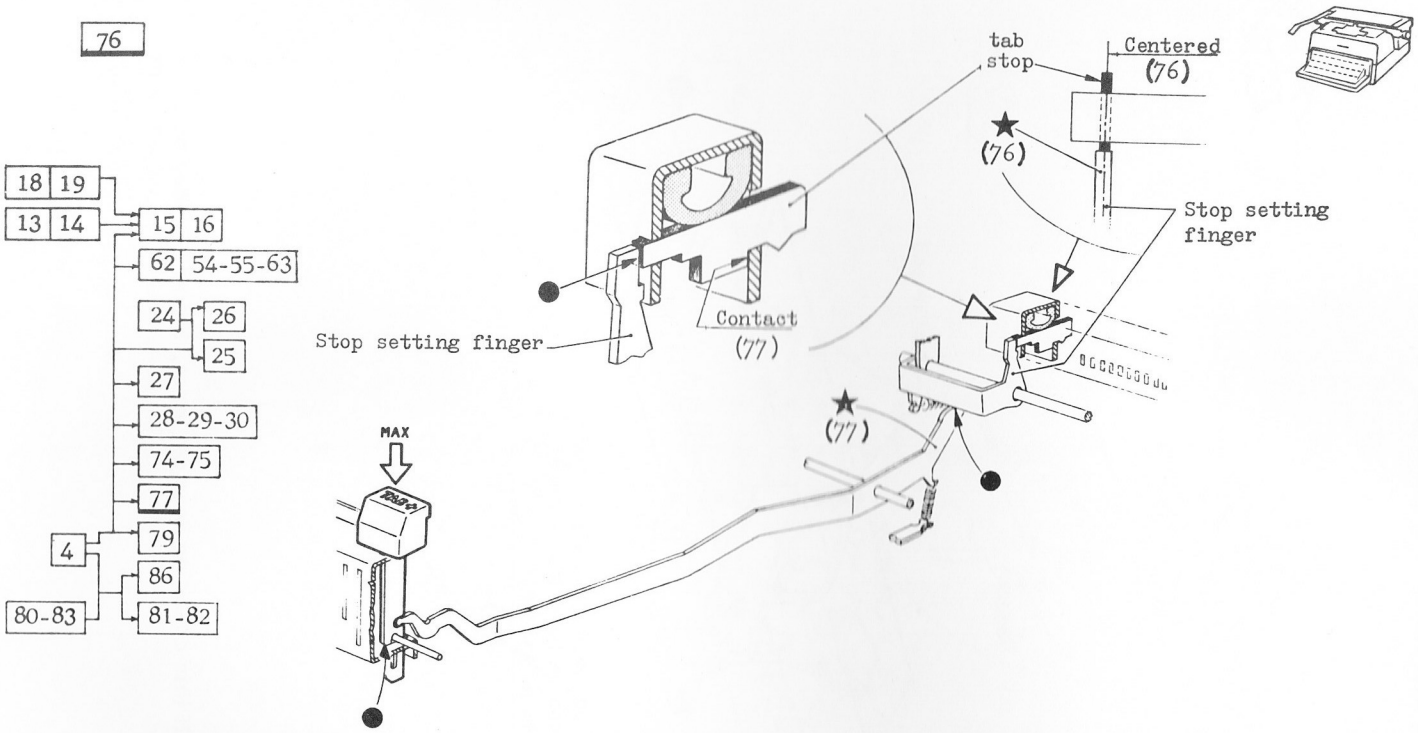


- Back space key at rest.

ACTIVATED POSITION OF BACK SPACE MECHANISM



- Remove the carriage.
- Manually rotate escapement wheel to obtain condition shown in figure 1. Slowly depress back space key fully and check that rotation of escapement wheel is 1½ teeth as shown in figure 2.

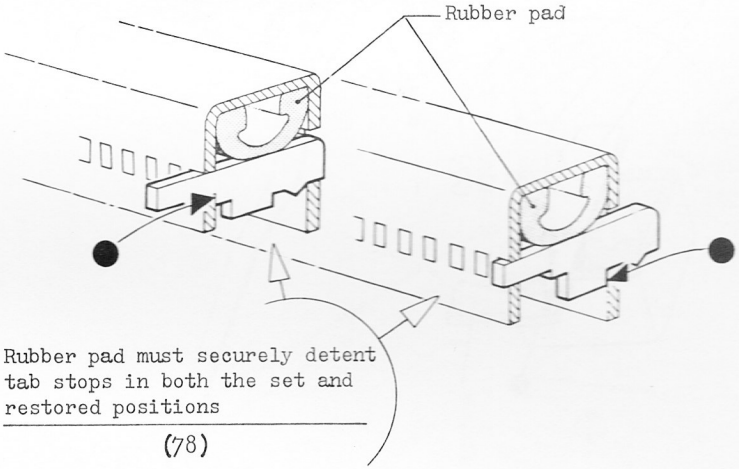


- Fully depress tab set key.

Note: This check may be performed on the first tab stop for best visibility.

76-77

78

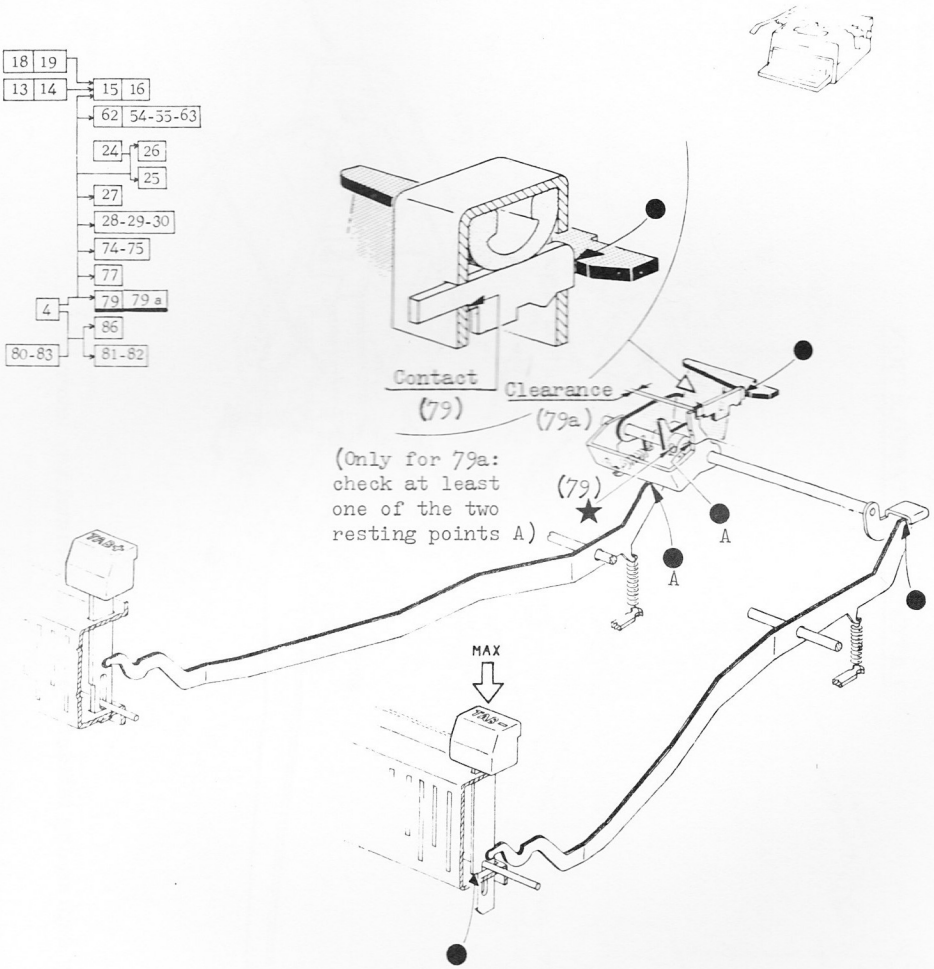


(78)

Note: If this condition does not exist, replace rubber pad.

79 - TAB CLEAR

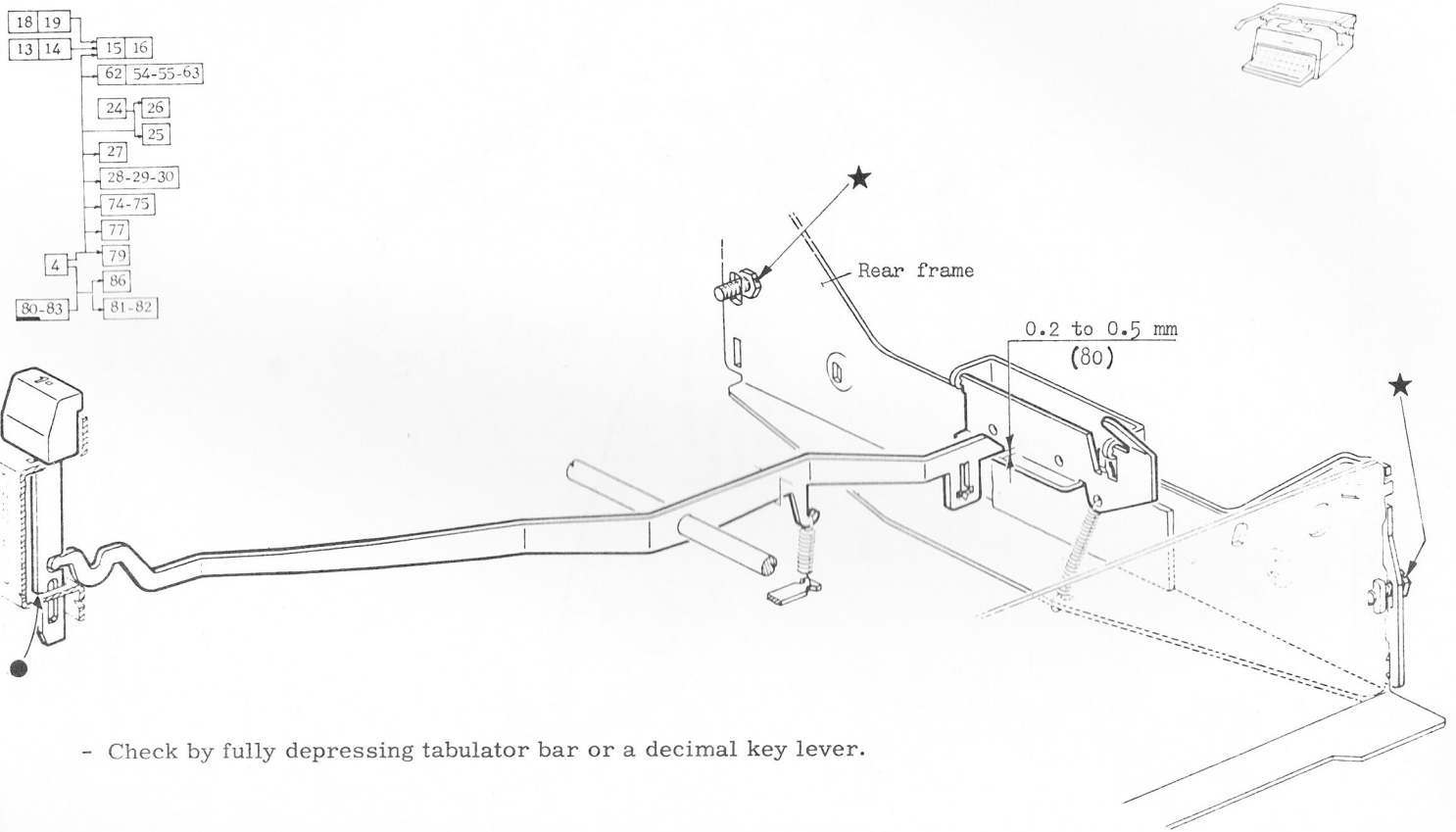
79a - REST POSITION OF TAB STOP SETTING FINGER



79 - Tab clear key fully depressed.

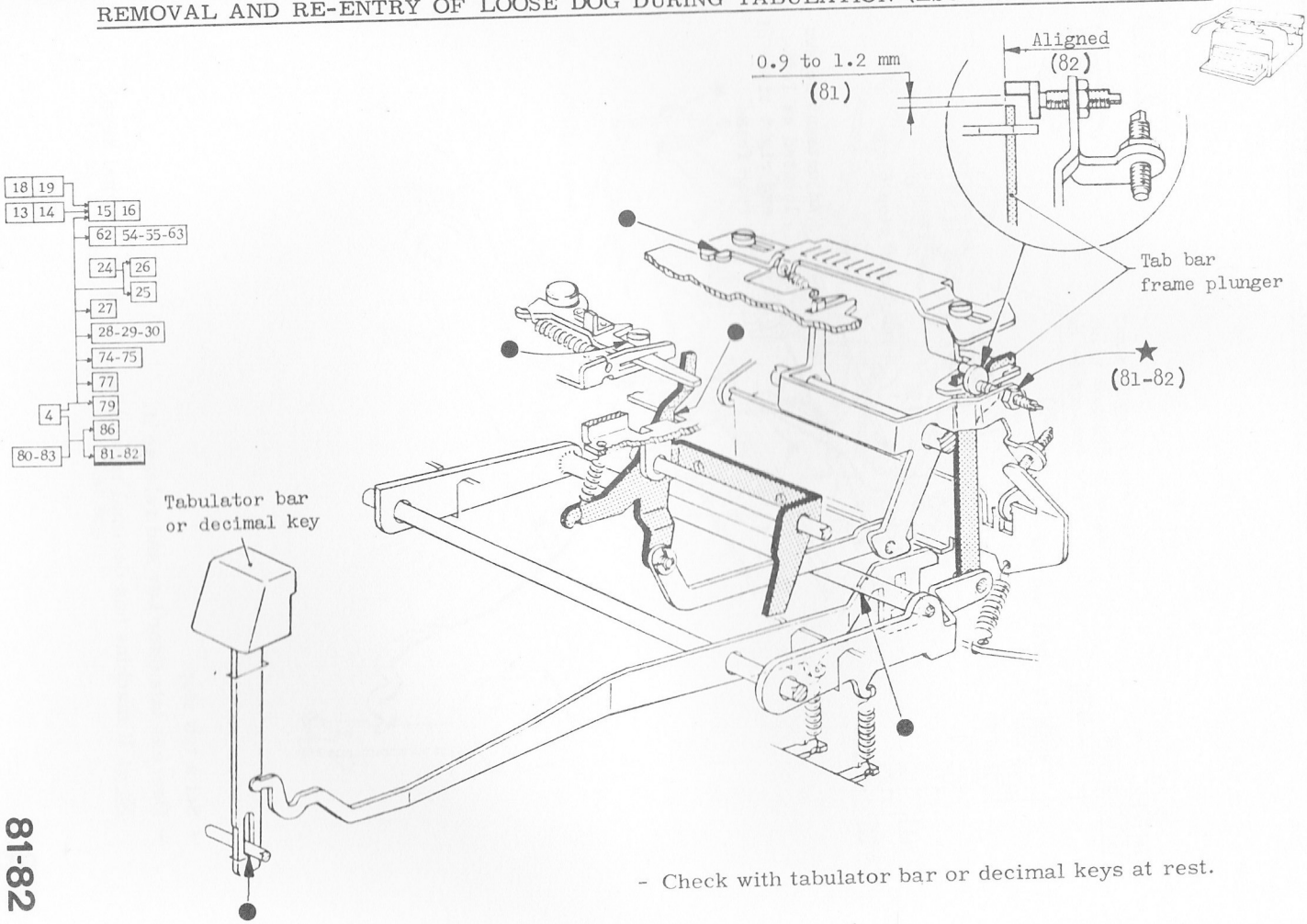
79a - Tab set key at rest.

LATCHING IN TABULATION



- Check by fully depressing tabulator bar or a decimal key lever.

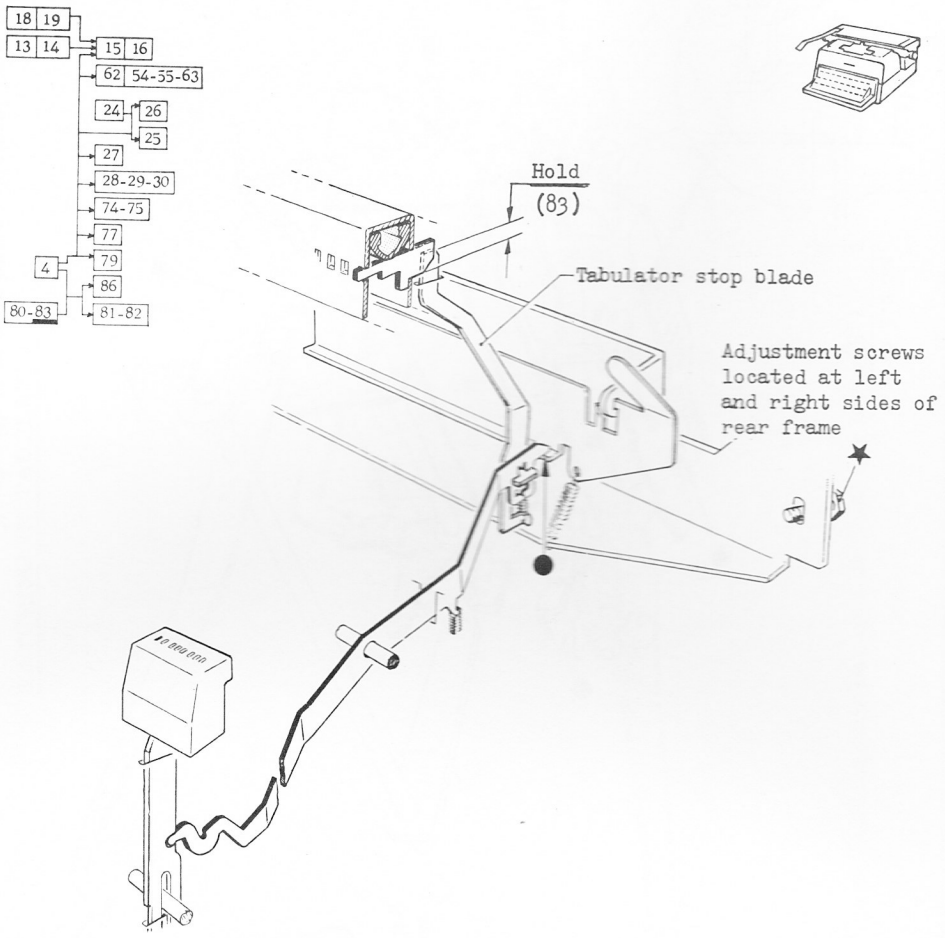
REMOVAL AND RE-ENTRY OF LOOSE DOG DURING TABULATION (ESCAPEMENT RELEASE)



- Check with tabulator bar or decimal keys at rest.

81-82

ACTIVATED POSITION OF TABULATOR BAR (OR DECIMAL TAB KEYS)

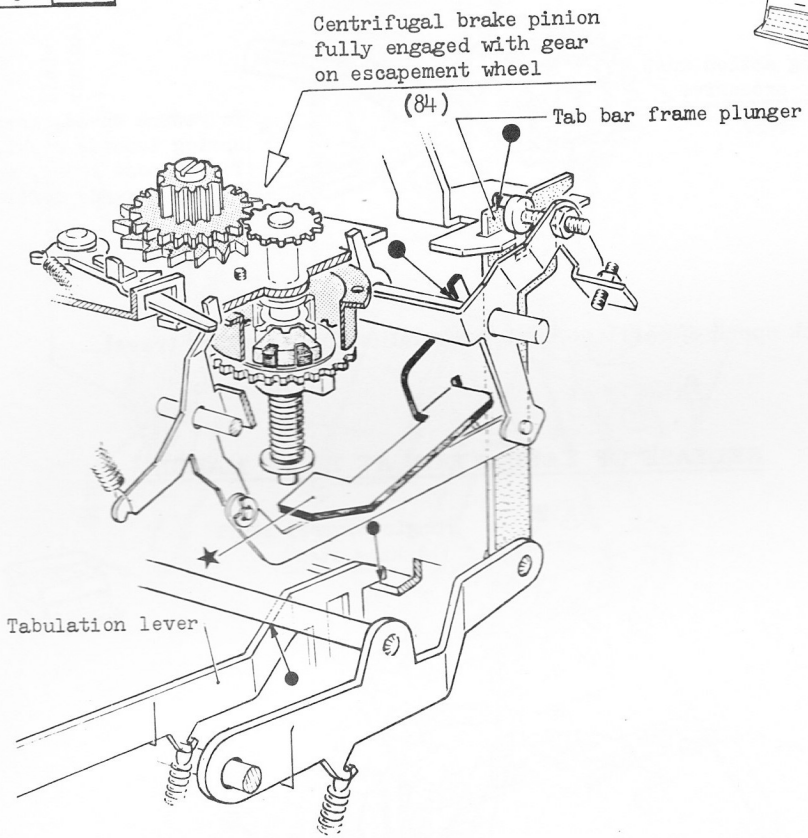


- Set a tab stop.
- Depress tabulator bar and release it.

Note: If machine has decimal tabulation, check all decimal keys.

ENGAGEMENT OF TABULATOR BRAKE DURING TABULATION

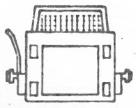
31 | 84

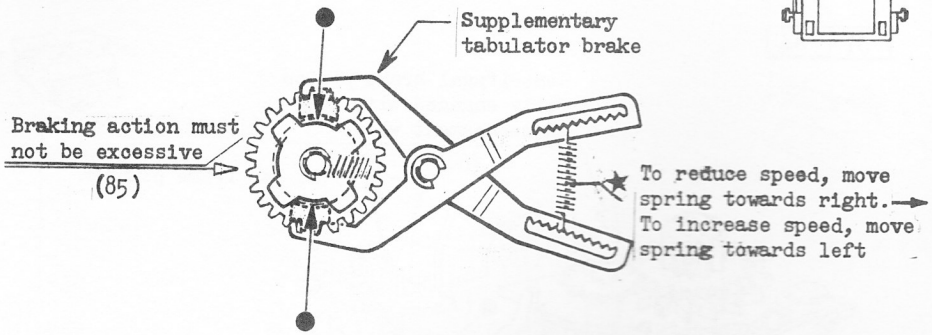


- Depress tabulator bar (or a decimal key).

SPEED OF CARRIAGE DURING TABULATION

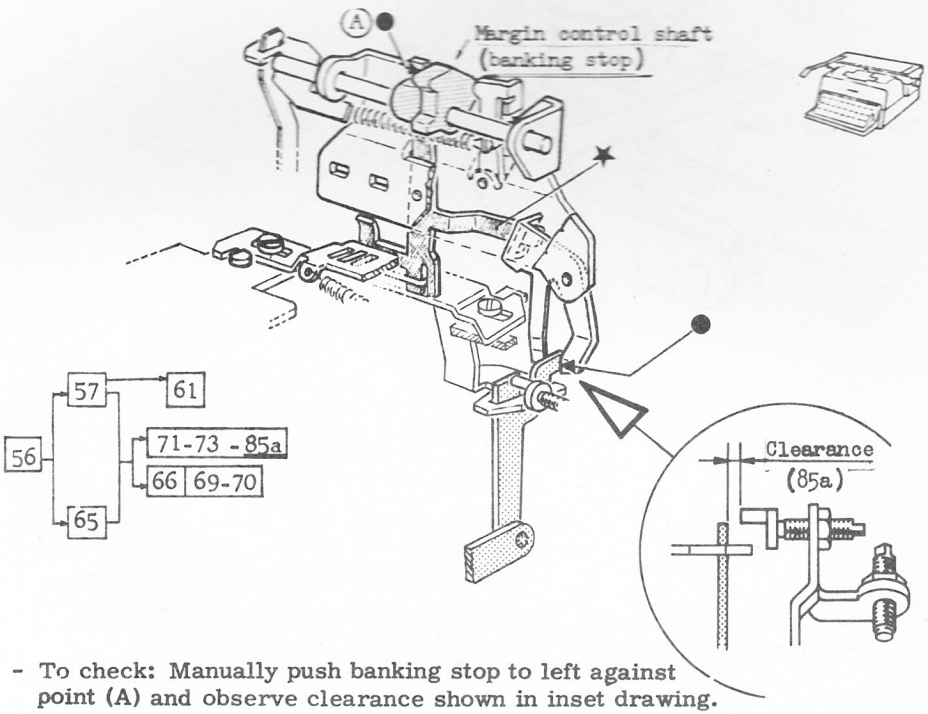
85




Supplementary tabulator brake
Braking action must not be excessive
(85)
To reduce speed, move spring towards right.
To increase speed, move spring towards left

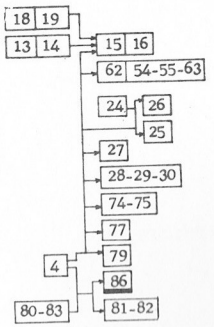
- Check speed of carriage during tabulation for its entire travel.

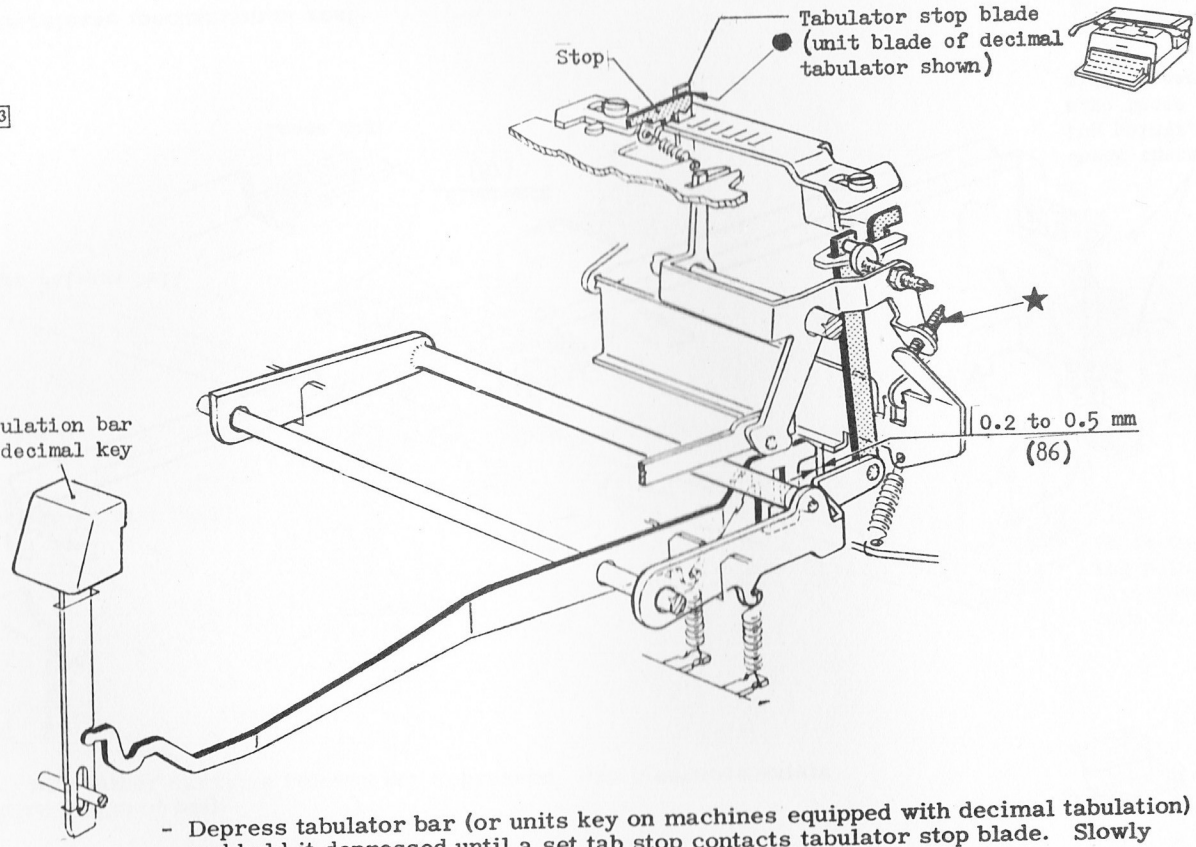
RELEASE OF TABULATION AT RIGHT MARGIN



- To check: Manually push banking stop to left against point (A) and observe clearance shown in inset drawing.

UNLATCHING OF TABULATION BAR OR DECIMAL KEY

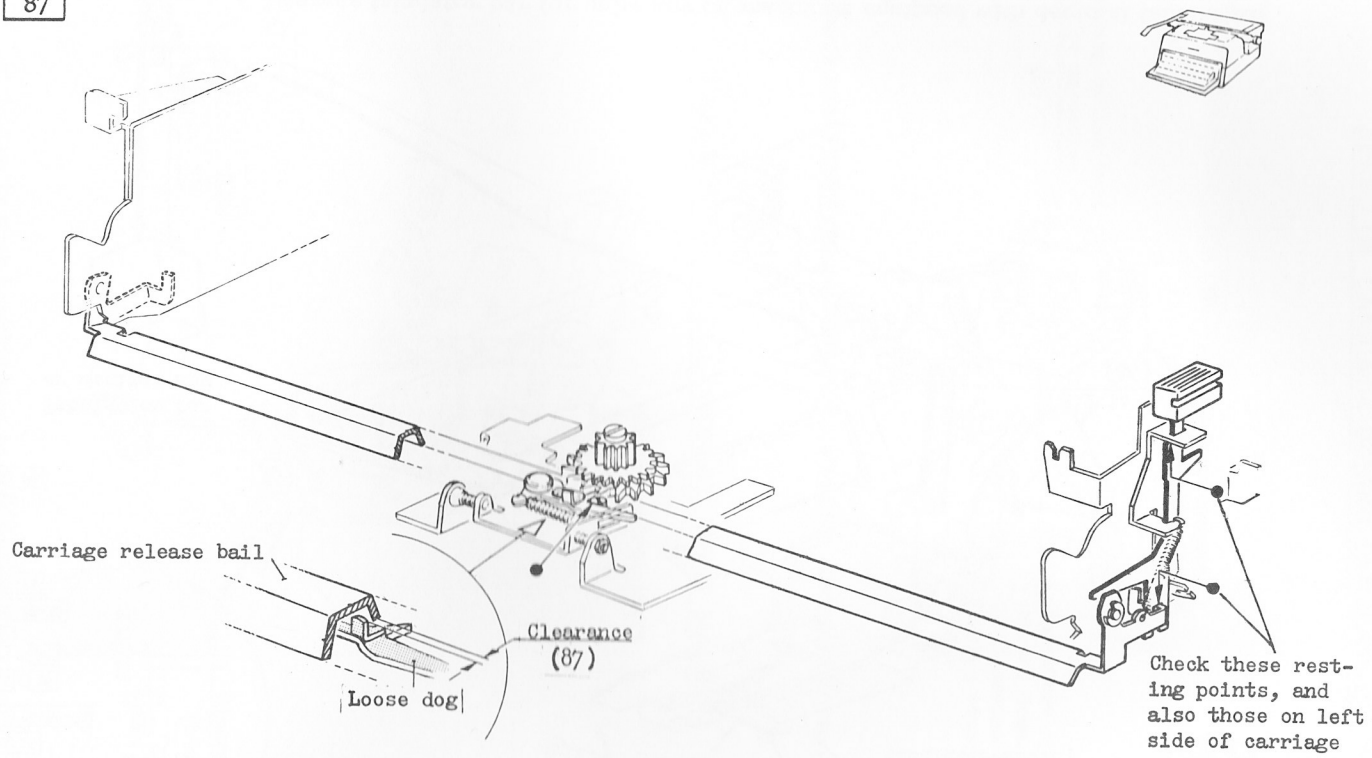




- Depress tabulator bar (or units key on machines equipped with decimal tabulation) and hold it depressed until a set tab stop contacts tabulator stop blade. Slowly release key while checking clearance shown in illustration.

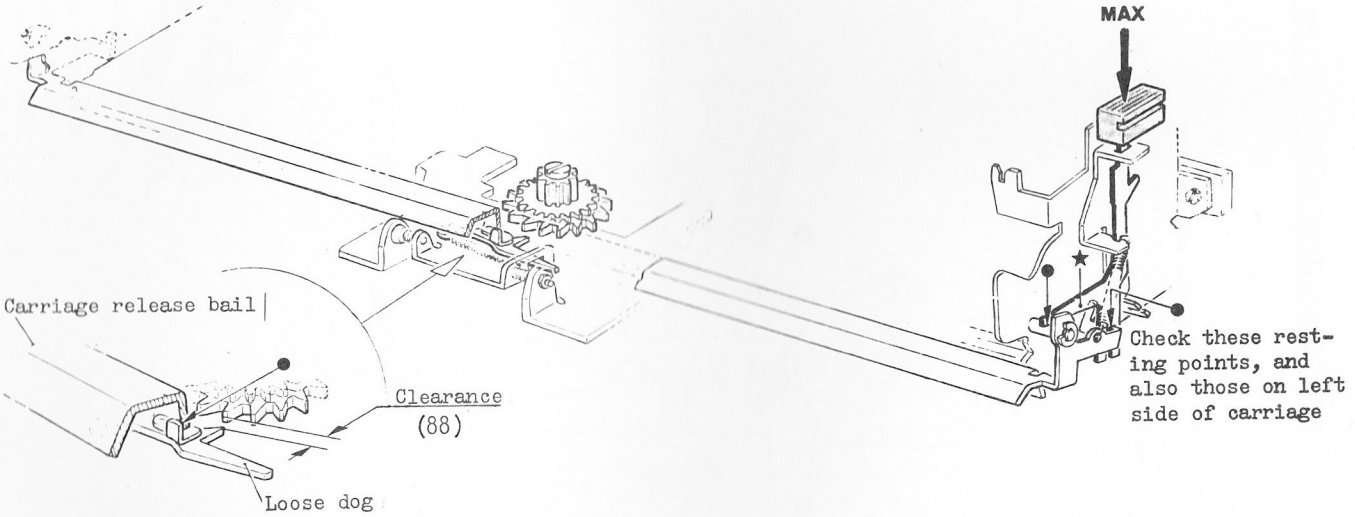
REST POSITION OF CARRIAGE RELEASE BAIL

87



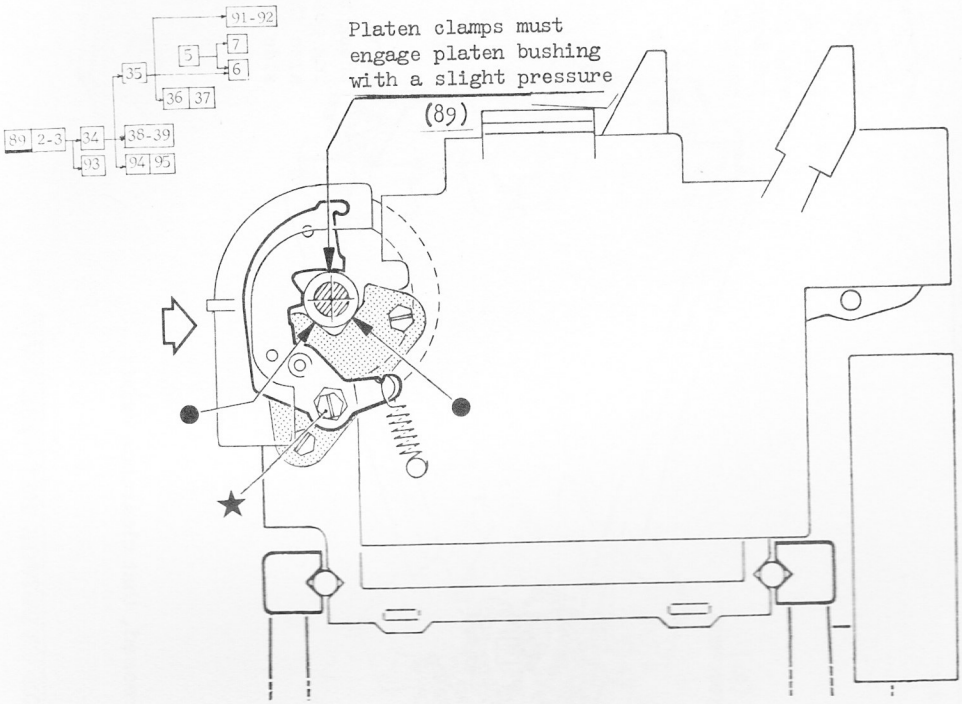
- Carriage release mechanism at rest.
- Check clearance shown for entire length of bail.

88



- Check, with either carriage release key depressed, that clearance exists for entire length of bail.

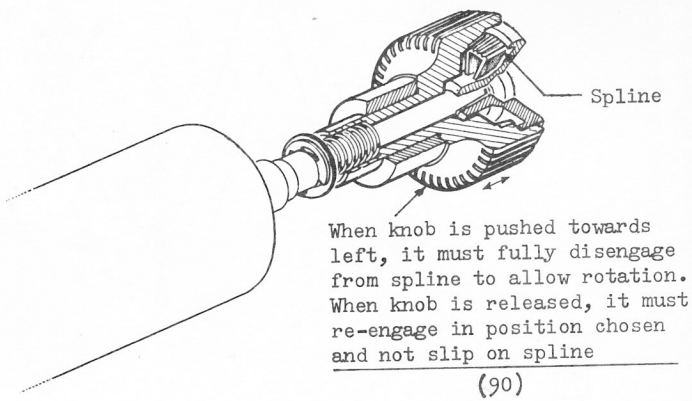
PLATEN CLAMPS (LEFT AND RIGHT)



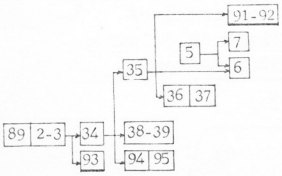
Note: Check both right and left platen clamps.

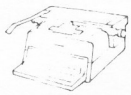
PAGE END INDICATOR

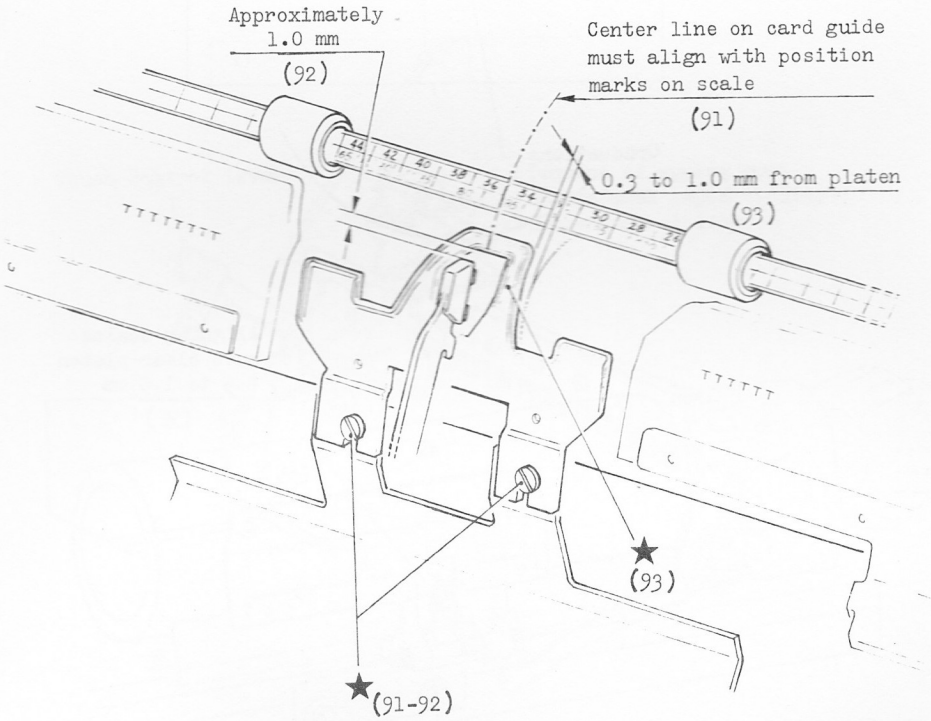
90


Spline
When knob is pushed towards left, it must fully disengage from spline to allow rotation. When knob is released, it must re-engage in position chosen and not slip on spline
(90)

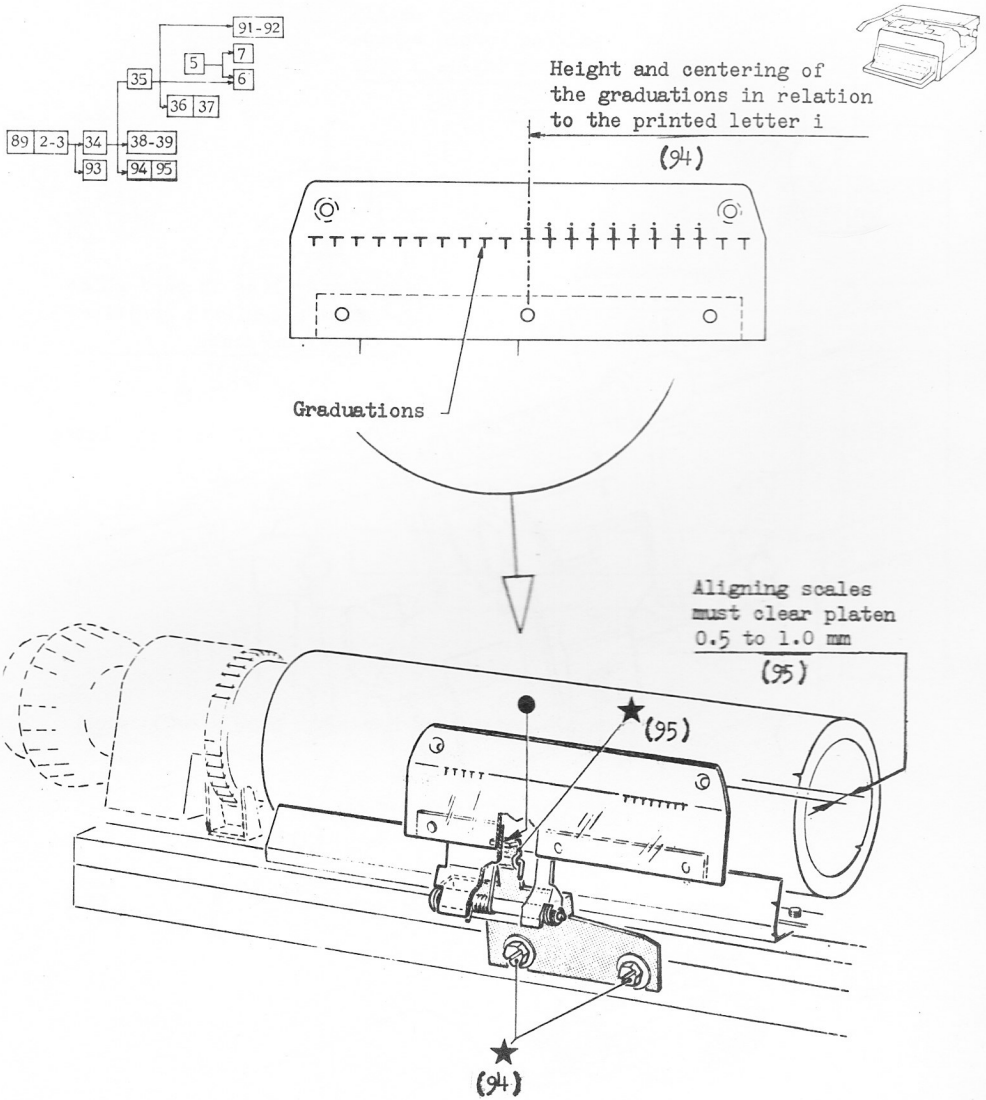
POSITION OF CARD GUIDE







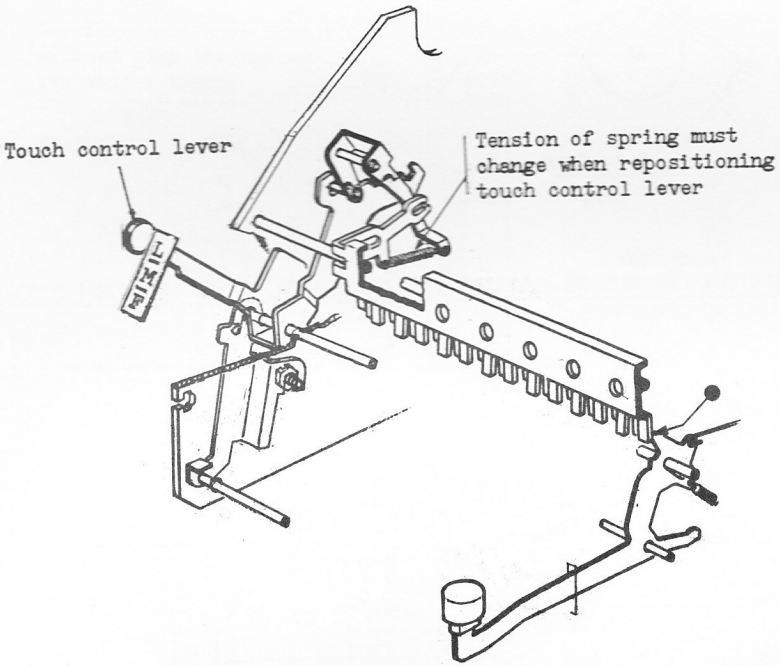
POSITION OF ALIGNING SCALES



- **Check both right and left aligning scales.**

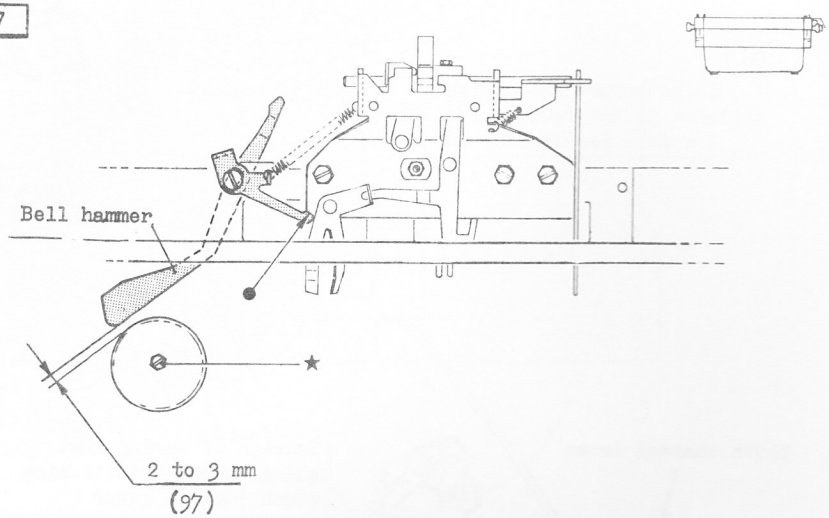
TOUCH CONTROL LEVER

96



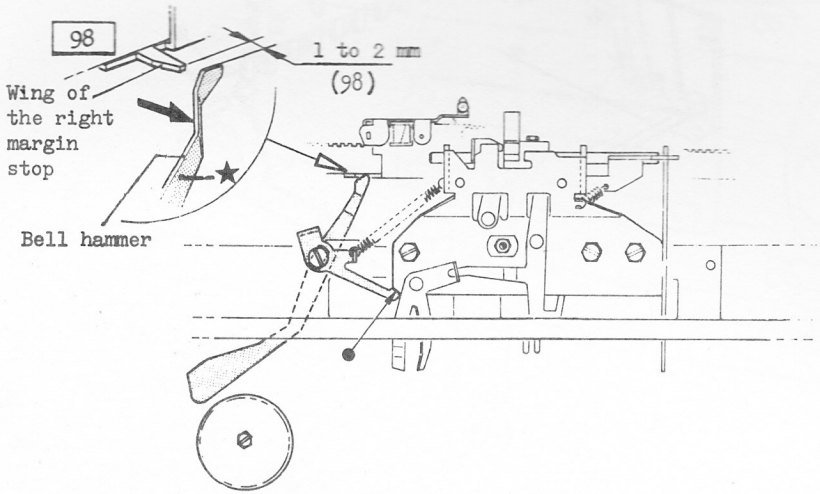
REST POSITION OF BELL HAMMER

97



POSITION OF BELL HAMMER IN RELATION TO MARGIN STOP

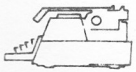
98

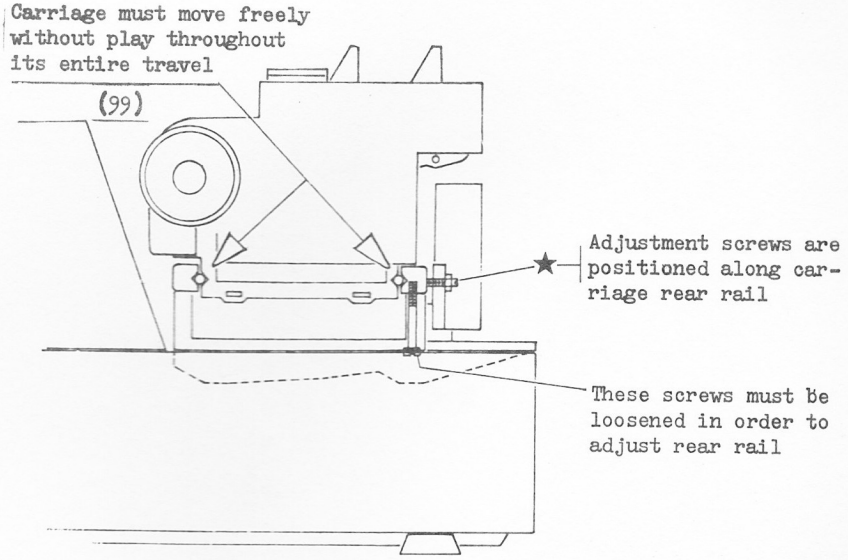


- To ensure that bell hammer will safely bypass wing of right margin stop when carriage is returned to right, move right margin stop in contact with bell hammer. Push bell hammer toward rear of machine and check if clearance exists as shown in illustration.

CARRIAGE MOVEMENT

99



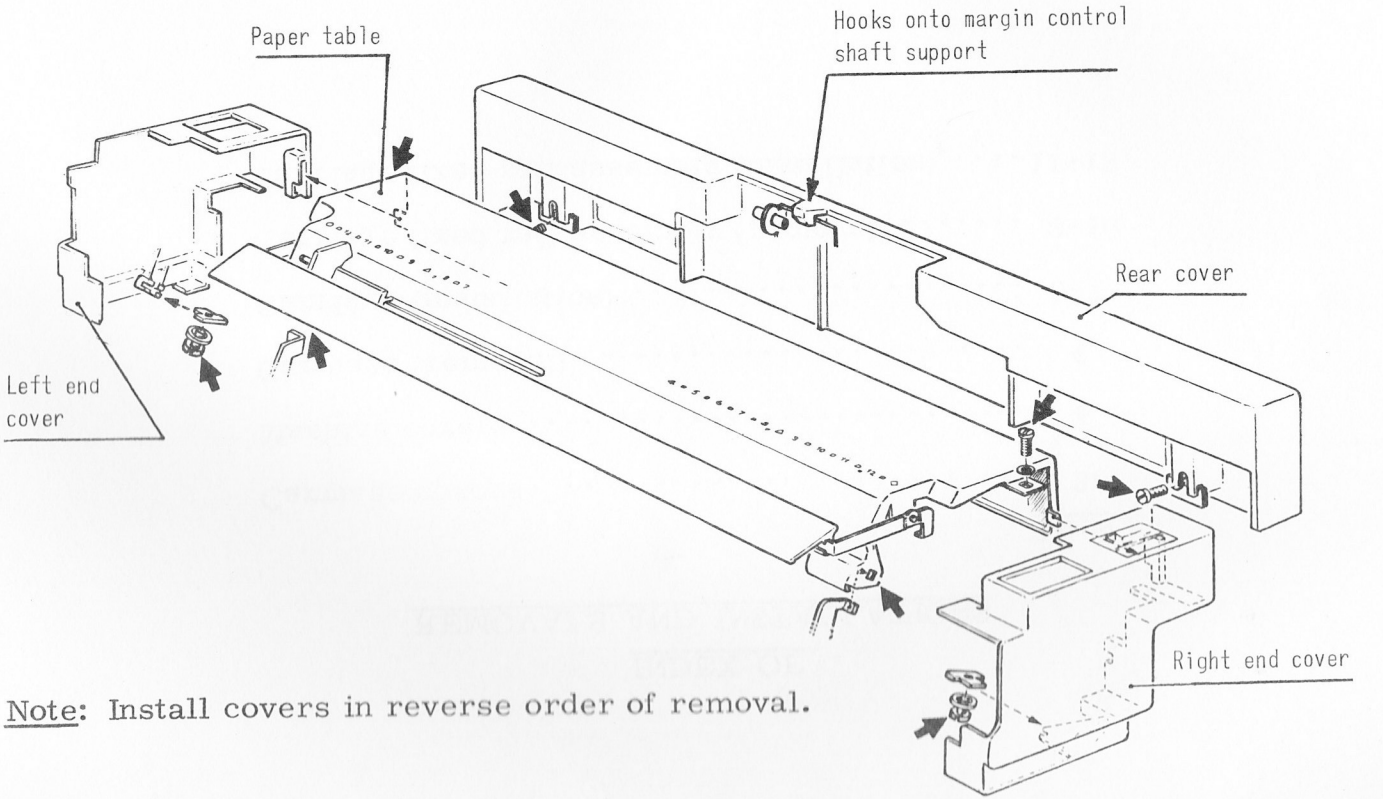

Carriage must move freely without play throughout its entire travel
(99)
Adjustment screws are positioned along carriage rear rail
These screws must be loosened in order to adjust rear rail

REMOVALS AND INSTALLATIONS

INDEX OF
REMOVALS AND INSTALLATIONS

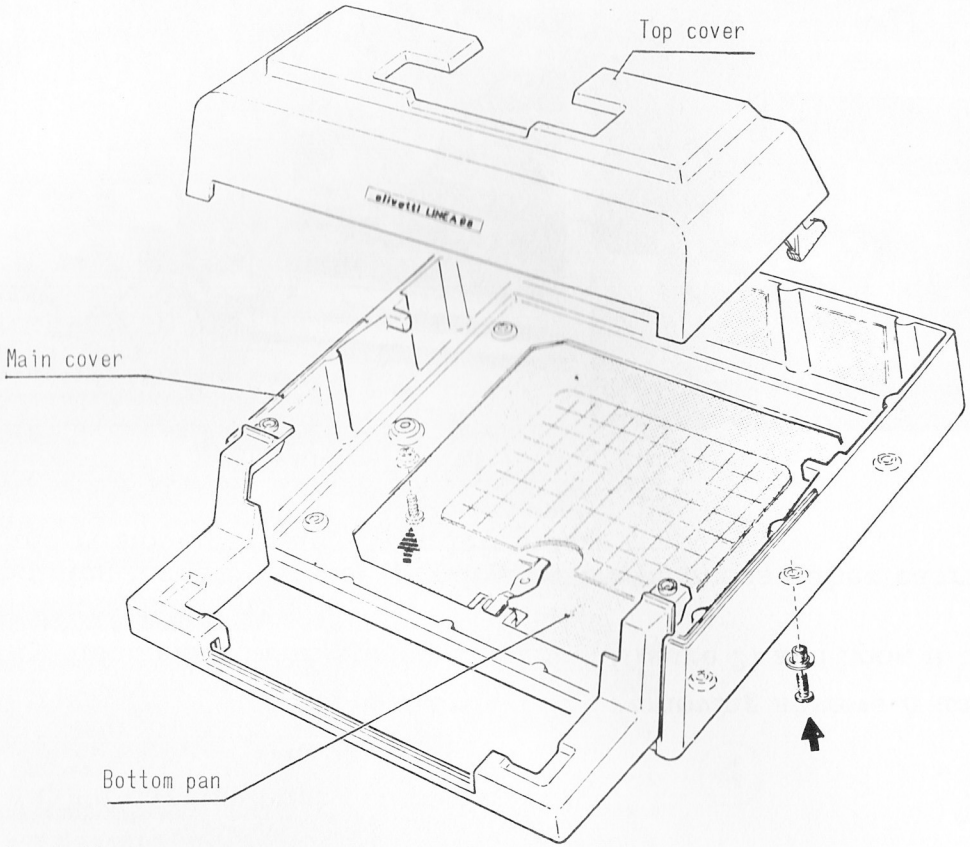
	Page
Carriage covers	2
Machine covers	3
Carriage (removal)	4
Carriage (installation)	5-7
Carriage fixed rail assembly (removal)	8-10
Carriage fixed rail assembly (installation)	11-13

CARRIAGE COVER REMOVAL



Note: Install covers in reverse order of removal.

MACHINE COVER REMOVAL

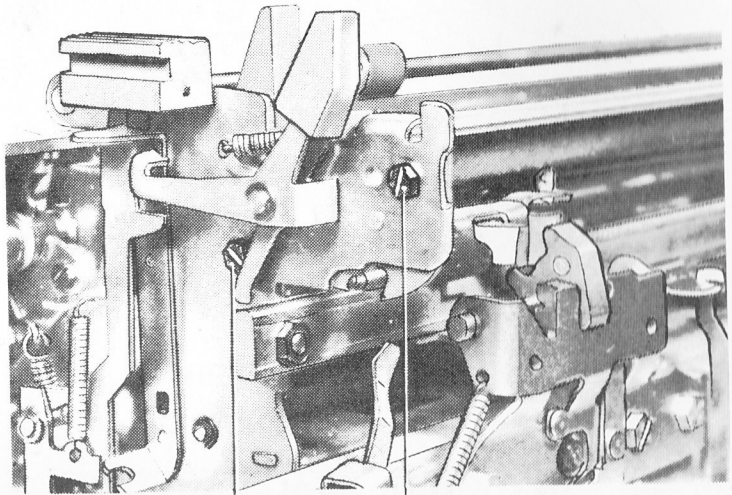


Note: Install covers in reverse order of removal.

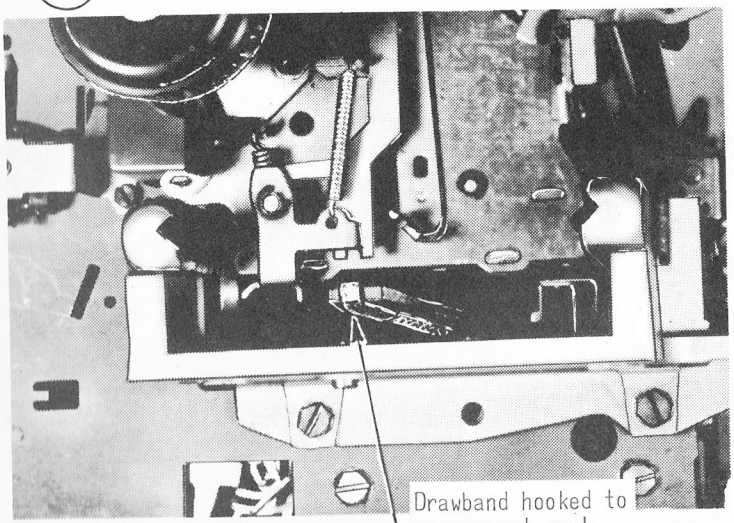
CARRIAGE REMOVAL

- Remove right carriage end cover (page 2).
- Remove paper table (page 2).
- Remove right limit stop support bracket by removing screws A and B (figure 1).
- Carefully disconnect main spring drawband (figure 2) and hook it on anchor stud in fixed rail assembly.
- While holding margin release key depressed, depress either carriage release button and remove carriage from left side.

1



2

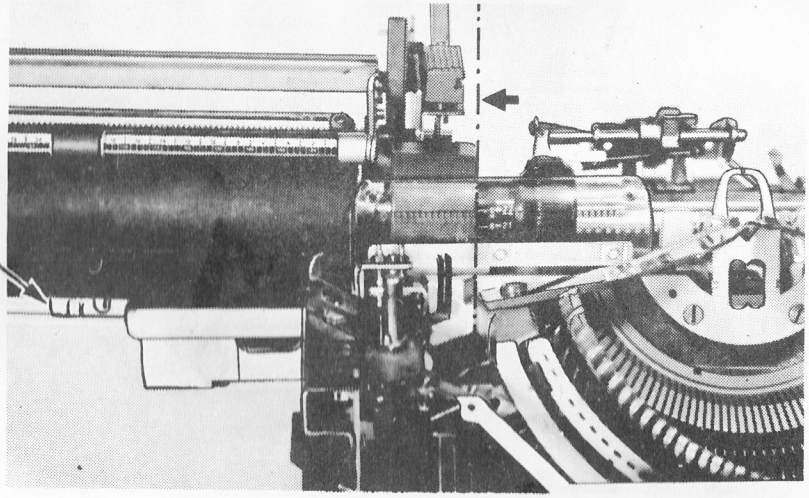


CARRIAGE INSTALLATION

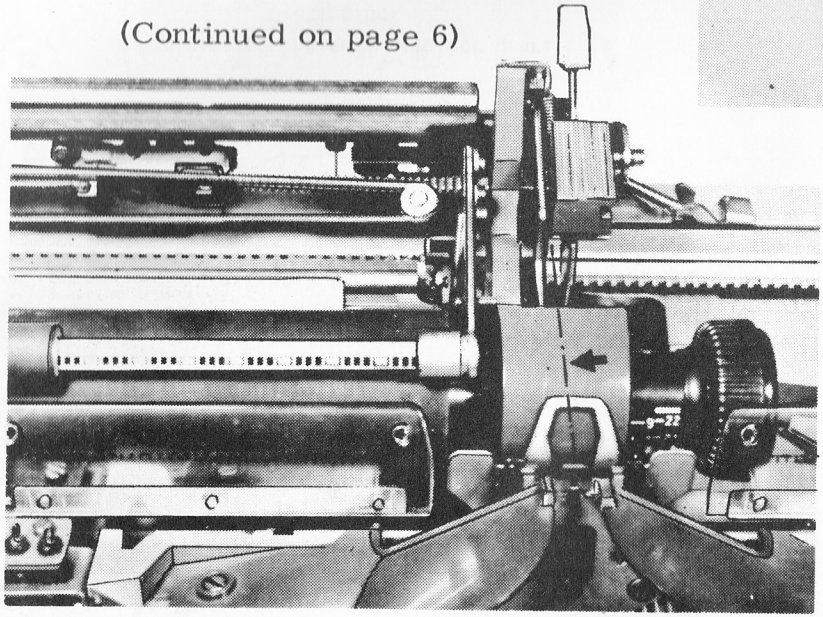
- Place carriage in fixed rail assembly as shown in figure 3. Hold carriage in this position while fully inserting front and rear roll retainers from left side.

- Slide carriage to position shown in figure 4, and insert front and rear roll retainers from right side.

(Continued on page 6)



3



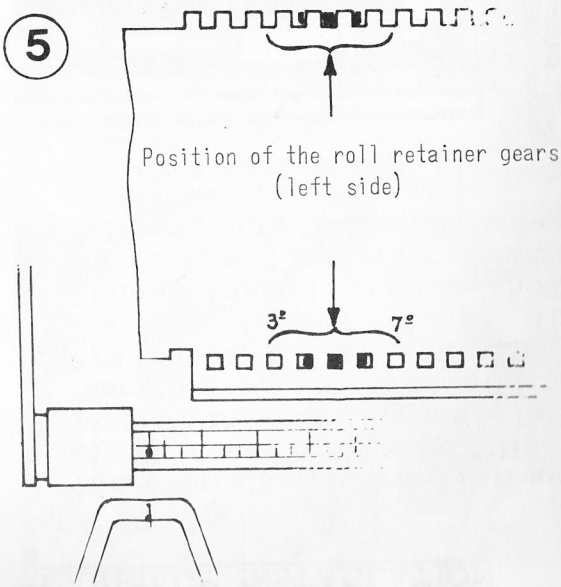
4

- Manually move carriage to position "0" of carriage positioning scale. (Caution: Do not use carriage release levers at this time as this could cause carriage release bail to position in front of wing of loose dog causing carriage to jam.) Check that gears of left roll retainers are positioned as shown in figure 5.

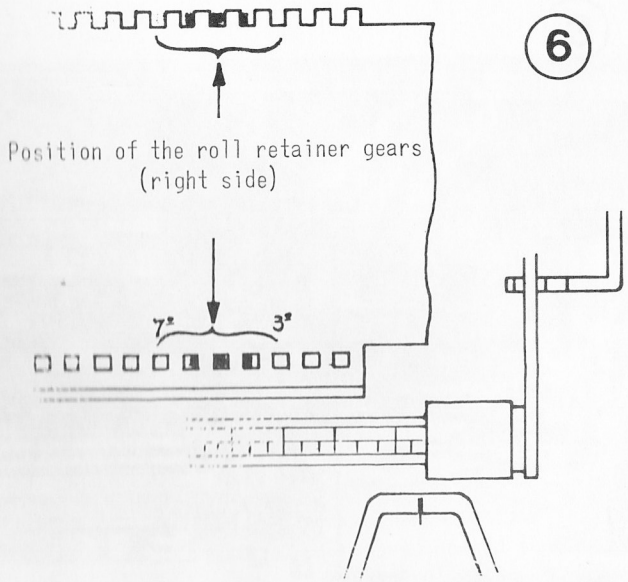
- Manually position carriage at last graduation of carriage positioning scale, and check that right roll retainers are positioned as shown in figure 6.

(Continued on page 7)

5



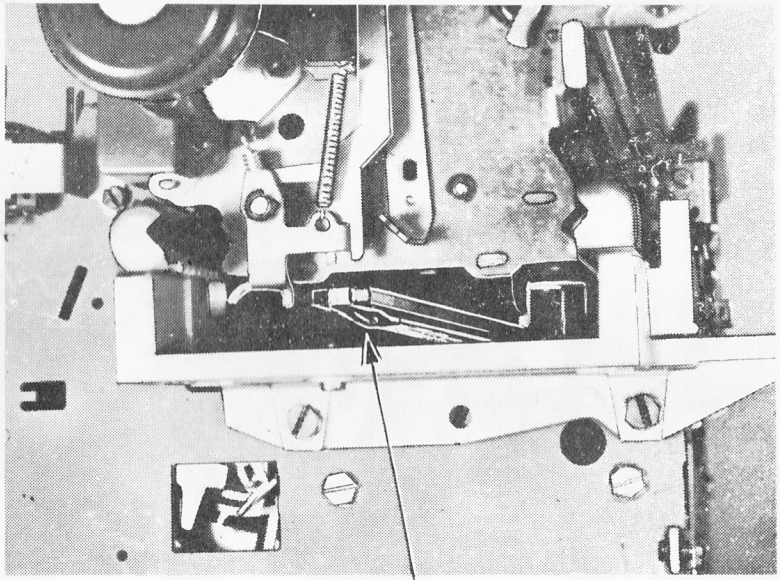
6



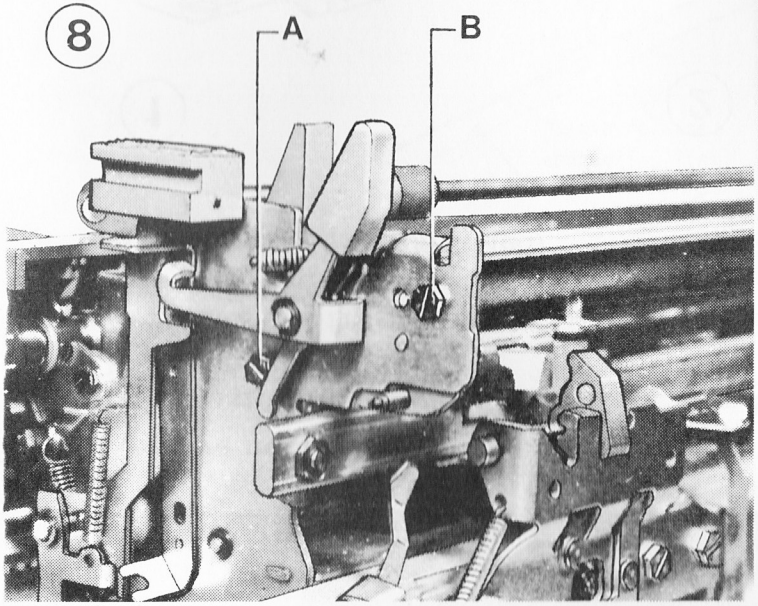
- Connect drawband (figure 7).

- Install left limit stop support bracket with screws A and B (figure 8).

- Install two end covers, rear cover and paper table (page 2).



7



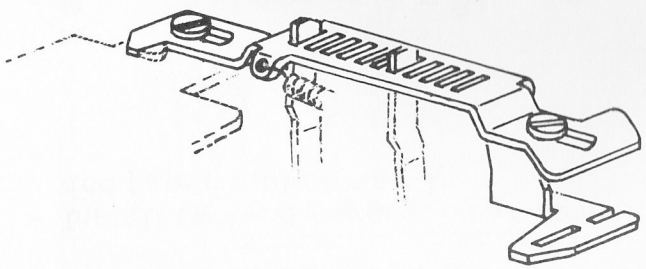
8

REMOVAL OF CARRIAGE FIXED RAIL ASSEMBLY

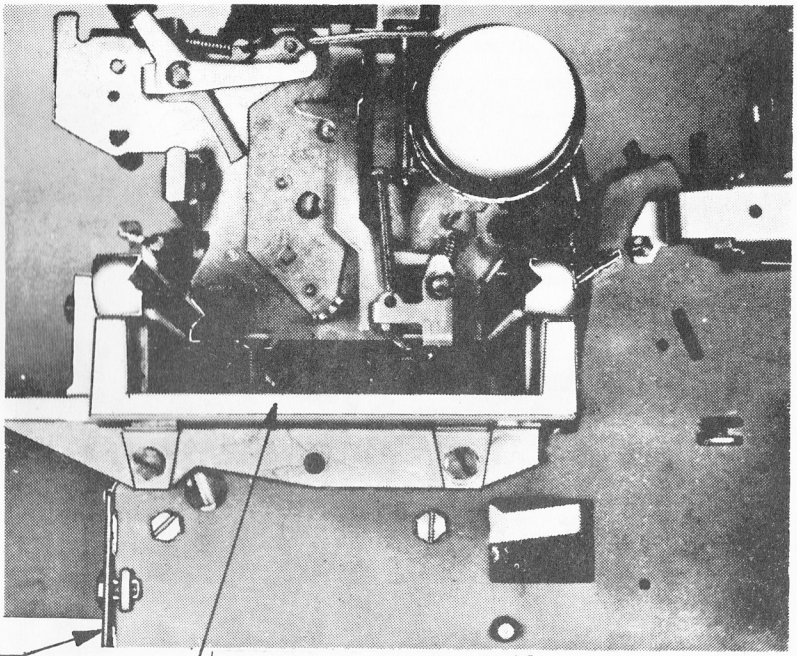
- Remove machine from its case (page 3).
- Note position(s) in which tabulator stop blade(s) is located in guide comb (figure 1).
- Remove rear frame (figure 2).

(Continued)

1



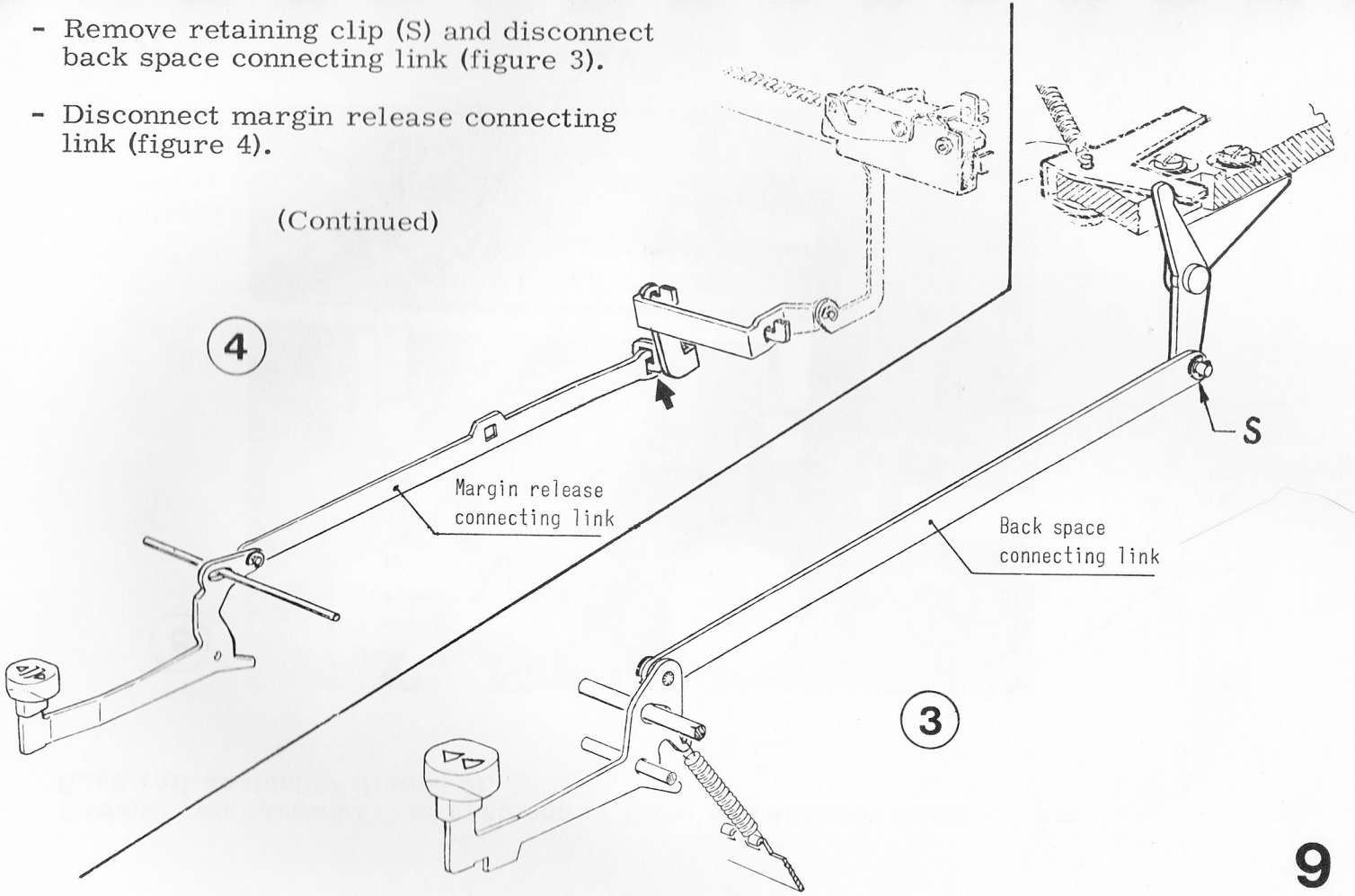
2



- Remove retaining clip (S) and disconnect back space connecting link (figure 3).

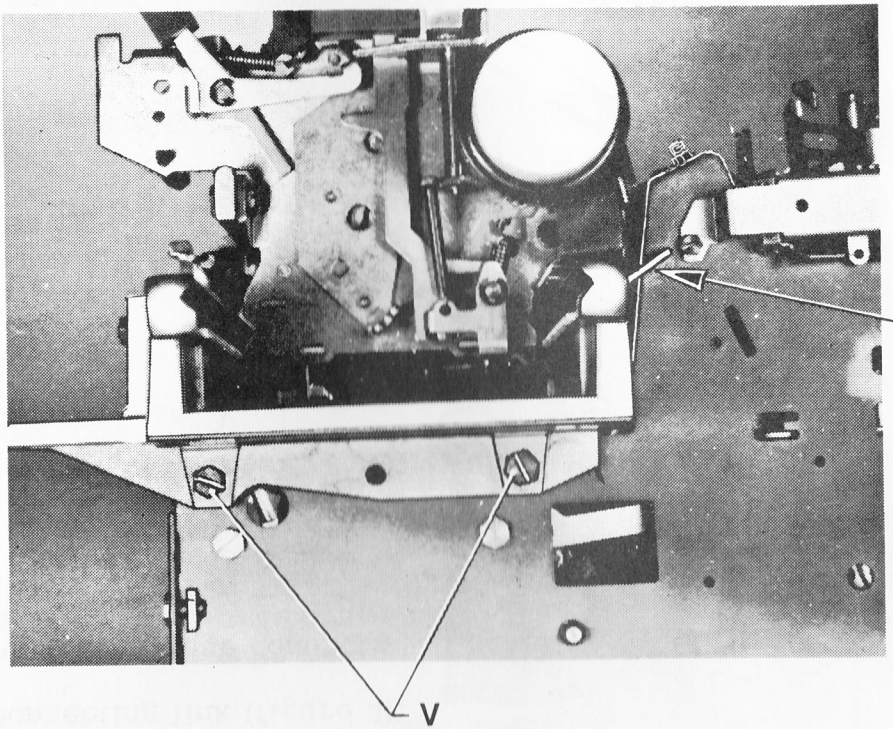
- Disconnect margin release connecting link (figure 4).

(Continued)



- Remove two screws (V) at each end of fixed rail assembly and remove fixed rail assembly (figure 5).

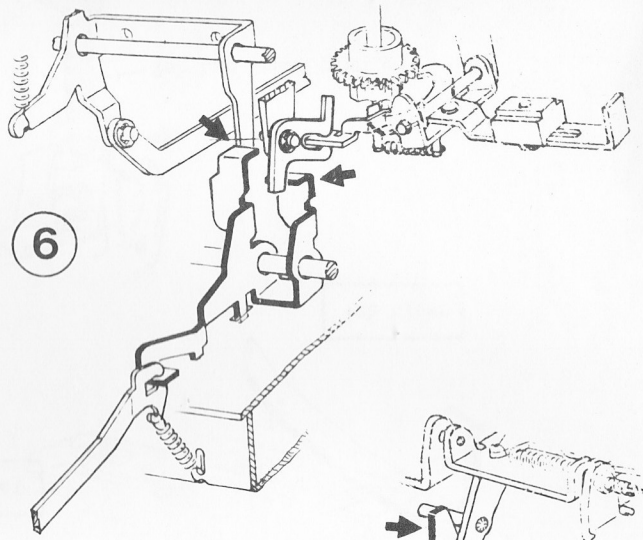
5

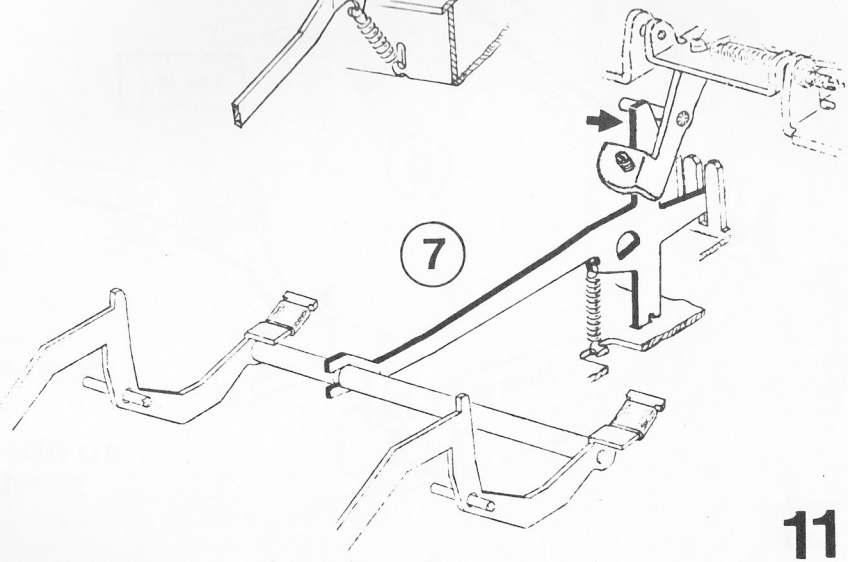


INSTALLATION OF FIXED RAIL ASSEMBLY

- Position fixed rail assembly on machine and check that:
  - Slotted guide brackets (left and right) engage machine side walls.
  - Two wings of repeat space control bridge are positioned as shown in figure 6.
  - Space bar trip lever is positioned as shown in figure 7.

(Continued)

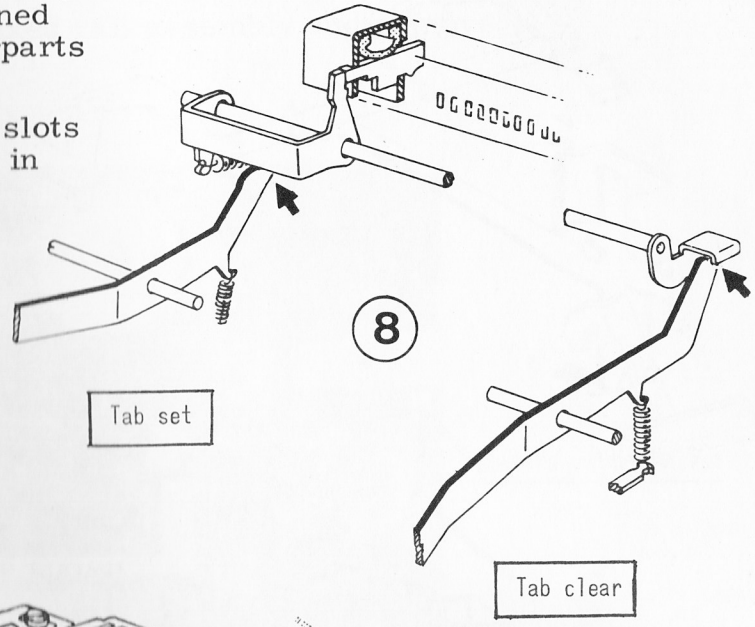


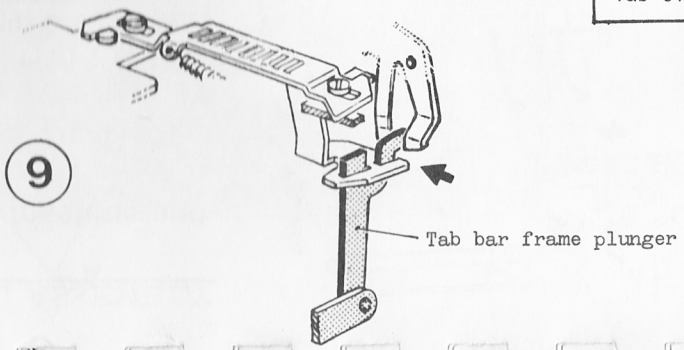


- Tab set and clear levers are positioned correctly in respect to their counterparts as indicated by arrows in figure 8.
- Tab bar frame plunger is located in slots of guide comb as indicated by arrow in figure 9.

- Secure carriage fixed rail assembly to machine with four screws (V) figure 5.
- Connect margin release and back space connecting links, figures 3 and 4.

(Continued)



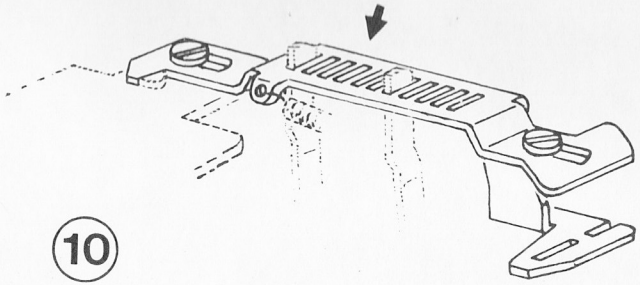


- Insert tabulator stop blade(s) back into original slot(s) of guide comb (figure 10).

- Install rear frame (figure 2) and adjust its height position by referring to check/page 80.

- Perform a "functional check" of machine.

- Install machine covers (page 3).



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